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Sanitary Reforms

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French	Indigence as Cause of Typhus.
"	Dwellings in Liverpool
Baylis —	Birkenhead for the year 1870
Rumsey	Sanitary Laws
~~Hind Meat~~	
Darby —	Hind meat
	Laws of Public Health as applied to India
Weaver —	Leicester
Morgan —	Meat Preservation
Rumsey	Sanitary Legislation
Thomson	Phthisis in Melbourne

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REPORT

ON THE

SANITARY CONDITION

OF THE

CITY OF LONDON.

FOR THE YEAR 1869—1870.

BY

H. LETHEBY, M.B., M.A., PH.D., &c.,

MEDICAL OFFICER OF HEALTH FOR THE CITY OF LONDON,

AND PROFESSOR OF CHEMISTRY IN THE COLLEGE OF THE LONDON HOSPITAL.

LONDON:

JUDD & CO., PRINTERS, DOCTORS' COMMONS, E.C.

1871.

Bequeathed
by DR. E.A. PARKES.

At a Meeting of the Commissioners of Sewers of the City of London, held at the Guildhall of the said City, on Tuesday, 10th January, 1870:—

The Medical Officer of Health laid before the Court his Annual Report.

ORDERED—

That the same be printed and curculated as usual.

JOSEPH DAW,
Principal Clerk.

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REPORT

ON THE

SANITARY CONDITION

OF THE

CITY OF LONDON,

THE TWENTY-FIRST ANNUAL REPORT OF THE MEDICAL OFFICER OF HEALTH.

To the Honourable Commissioners of Sewers of the City of London.

Gentlemen,

I have the honour to submit the statistical facts relating to the sanitary condition of the City of London for the year which ended in September last. They are appended, as usual, in tabular form; and you will perceive that 1,996 births, 2,025 deaths, and 1,250 marriages were registered in the City during the year. All these numbers are considerably below the averages for the last ten

years, and they are in the annual proportion of 17·4 births, 17·7 deaths, and 10·9 marriages per 1000 of the population, according to the census of 1861. In all England the averages are 35·1 births, 22·6 deaths, and 8·4 marriages per 1000 of the people.

I am not able to distribute the marriages, as I have hitherto done among the several Unions of the City, because, on the 1st of January last, the East and West London Unions were incorporated with the City of London Union, by direction of the Poor Law Board, and from that time the whole of the marriages in the City have been returned under one heading, namely, "The City of London Union;" but the births and deaths of the three Unions were as follow:—

Number of Marriages, Births, and Deaths, in the several Unions of the City in 1870, *and the Annual Averages for the last Ten Years.*

	Marriages.	Births.	Deaths.
East London Union (1870)	—	945	833
Annual Average of Ten Years	480	1,158	997
West London Union (1870)	—	505	513
Annual Average of Ten Years	451	693	698
City of London Union (1870)	—	546	679
Annual Average of Ten Years	578	847	879
Entire City (1870)	1,250	1,996	2,025
Annual Average of Ten Years	1,509	2,698	2,574

These numbers are at the following rates per 1000 of the population:—

Number of Marriages, Births, and Deaths per 1,000 *of the Population of the City, and elsewhere.*

	Annual Rate per 1,000 Living.		
	Marriages.	Births.	Deaths.
East London Union (1870)	—	22·89	20·18
West London Union	—	18·89	19·18
City of London Union	...	11·75	14·61
Entire City (1870)	10·92	17·44	17·69
Ditto Average of Ten Years	13·18	23·57	22·48
London ,, ,,	10·12	35·09	24·06
England ,, ,,	8·46	35·35	22·48
France ,, ,,	7·98	26·57	23·27
Austria ,, ,,	8·37	40·16	30·58

As regards the marriages, these results show that the proportion has declined from an annual average of 13·18 per 1000 of the population to 10·92, which is only a little above the average for London (10·12), although it is much above the averages for the whole of England (8·46), France (7·98), and Austria (8·37).

The birth-rate in the City has fluctuated to a large extent; for in the central division of the City it was but 11·75 per 1000 of the population, whereas in the Western division it was 18·89, and in the Eastern 22·89—the average for the entire City being

17·44. During the last ten years the average birth-rate of the City has been 23·57. In the whole of the Metropolis it has been 35·09; in all England, 35·35; in France, 26·57; and in Austria, 40·16. The low birth-rate of the central division of the City is attributable to the circumstance that the population consists, in great part, of young unmarried persons, who are employed in the City warehouses, and perhaps also to a great falling off in the number of the population since the census of 1861. This, in fact, is the explanation of the apparently low birth-rate of all the districts of the City. There is, however, a remarkable feature in these statistics, namely, that notwithstanding the small proportion of births, the number of marriages is comparatively large: from which it may be inferred that those who marry in the City do not remain in it to contribute to its future population.

Of the 1,996 chidren born in the course of the year, 1,014 were males, and 982 females. These are in the proportion of 1,032 boys to 1000 girls—the average for the last ten years being 1,036 to 1000. In all England the average proportion is 1,043 to 1000, and in the whole of London it is 1,036 to 1000.

The largest number of births occurred in the winter quarter, ending in March, and the smallest

in the spring, ending in June: in fact, if we take 1000 as the average for each quarter, it will be found that only 944 occurred in the spring time, 996 in the summer, 988 in the autumn, and 1,072 in the winter. This is a little abnormal, for the average proportions throughout England are 1,036 for the spring quarter, 965 for the summer, 960 for autumn, and 1,039 for the winter.

The death-rate in the City ranged as we have said from 14·6 per 1,000 of the inhabitants of the Central district, to 20·2 of the Eastern—the average for the entire City being 17·7. In the preceding ten years, the average has been 22·5. In the whole of the Metropolis it has been 24·1; in England, 22·5; in France, 23·3; and in Austria, 30·6. These large differences of death-rate are, as I explained in my last yearly report, attributable to similar differences of birth-rate; for as the mortality of children is excessively high (amounting to not less than 160 per 1,000 per annum, the rest of the population being only 20) it follows, as a matter of course, that wherever the birth-rate is large, the death-rate also must be large; and therefore, the death-rate alone of any place will afford no indication of its comparative salubrity. I entered very fully into this matter in my last annual report, and showed you that a high death-rate, instead of being an indication

of insalubrity, is often a sign of prosperity, for it generally tells of a high birth-rate, which is the unmistakeable characteristic of a flourishing community.

Of the 2,025 deaths in the City during the year, 1,007 were males and 1,018 females. This is the reverse of the common proportions; for during the last ten years the proportions were 922 females to 1,000 males; and in all England they are 959 to 1,000.

As regards the influence of season on the death-rate, as shewn in the third table of the appendix, the facts may be thus expressed—1,000 deaths in each quarter being taken as the average for comparison.

Proportional Number of Births and Deaths in each Quarter of the Year.

QUARTERS ENDING.	BIRTHS.			DEATHS.		
	City of London.		England.	City of London.		England.
	1870.	Average of Ten Years.	Average of Ten Years.	1870.	Average of Ten Years.	Average of Ten Years.
March (Winter) ..	1,072	1,060	1,039	1,148	1,133	1,123
June (Spring) .	944	992	1,036	946	954	979
Sept. (Summer) ..	996	943	965	853	917	919
Dec. (Autumn) ..	988	1,005	960	1,053	996	979
Total	4,000	4,000	4,000	4,000	4,000	4,000

From this it will be remarked that there is great uniformity in the proportions of births and deaths in the several quarters—winter being the season when both occur in the largest proportion, and next to this is autumn, while the smallest number of births and deaths occurs in the summer season.

The distribution of the deaths according to age is shewn in the fourth Table of the Appendix. As I have already said, the largest mortality occurs among children of less than five years of age. In the East London Union the number of deaths at this period of life amounted to 42 per cent. of all the deaths; in the West London Union to rather less than 36 per cent; and in the City Union to only 26 per cent.—the mortality in the whole City being from 34 to 35 of all the deaths. The comparatively low mortality of children in the central district is evidently due to the small proportion of births in that district; for if we estimate the infant mortality according to the number of births in the three City Unions, it will be found that for every 100 children born in the Eastern and Western districts nearly 19 die before they are a year old, and in the Central division of the City 16. In all England the average death-rate of infants at this age is a little less than 16 per cent., whereas during the last ten years it has been just 17 per cent. in the City.

With respect to the causes of death, the principal facts are the following—tubercular diseases, including phthisis, tabes-mesenterica, scrofula, and hydrocephalus, have been less fatal than usual; the same has been the case with alvine disorders, continued fever, small-pox, measles, whooping-cough, and croup, but infantile convulsions, scarlet-fever, and inflammatory affections of the lungs have been more than usually fatal—the most notable increase being from scarlet-fever, which has risen from an average of 90 in the year to 127. The relative proportion of deaths from each of these causes has been as follows:—

Proportion of Deaths from each cause, in every 1,000 *Deaths from all causes.*

CAUSES.	East London Union.	West London Union.	City of London Union.	Entire City.	Average of Ten Years.	
					Entire City.	England.
Phthisis	118	144	119	125	130	113
Tabes, Scrofula, Atrophy and Infantile Debility	78	52	36	57	61	82
Hydrocephalus ..	16	21	10	15	19	16
Convulsions and Teething ..	77	83	40	66	56	65
Alvine disorders ..	31	35	21	28	36	43
Continued Fevers	37	13	24	26	39	29
Scarlet Fever ..	67	62	58	62	35	39
Small-pox ..	2	0	1	1	8	9
Measles	23	18	26	23	28	20
Whooping-cough, Croup, and Diptheria	46	25	34	36	53	44
Erysipelas.. ..	7	8	1	5	5	4
Pneumonia, Bronchitis and Asthma	174	164	180	173	165	149
Violence, Privation, Poison, Childbirth, and Premature Birth ..	35	56	52	50	57	58
Other causes, chiefly chronic ..	289	319	398	333	308	329
Total from all causes	1,000	1,000	1,000	1,000	1,000	1,000

So that tubercular diseases have declined from a general average of 210 per 1000 deaths to 197; and zymotic diseases from 204 to 181; while inflammatory affections of the lungs have advanced from 165 to 173. For two years past the number of deaths from scarlet-fever has been excessive: last year the number was 127, and the year before it was 123, whereas in the two proceeding years it was but 40 and 30. In the years 1863 and 1864, as well as in 1855, 1856, and 1859, the mortality from scarlet-fever was unusually high—in fact, it has prevailed as an epidemic on 70 ccasions during the last 16 years, and frequently with continued fevers. Last year the number of deaths from the various forms of continued fever was only 54, whereas in the 5 years from 1862 to 1866, inclusive, it ranged from 105 to 170 per annum. The causes of these fluctuations in the severity of the different kinds of zymotic diseases is entirely beyond our comprehension; for although each year has its special epidemic, yet in the aggregate the total mortality from all forms of zymotic disease remains about the same. This will be apparent from the following table:—

Classification of Deaths according to Zymotic Causes during the last Sixteen Years.

Years.	Alvine Disorders.	Continued Fevers.	Scarlet Fever.	Small-pox.	Measles.	Whooping Cough.	Croup and Diphtheria.	Erysipelas.	Total.
1855	181	129	196	58	46	106	52	31	699
1856	100	159	139	33	76	61	39	20	618
1857	133	109	65	14	48	114	50	20	553
1858	92	88	59	6	102	131	44	19	532
1859	113	107	127	47	88	121	52	10	665
1860	64	74	85	60	75	74	37	5	474
1861	97	70	66	4	119	125	77	19	577
1862	63	174	95	4	92	127	71	14	640
1863	79	113	204	44	70	80	63	20	673
1864	105	105	122	22	130	69	54	17	624
1865	86	106	69	8	24	114	63	18	488
1866	177	124	65	29	82	83	35	17	612
1867	103	70	30	31	13	39	31	12	329
1868	106	80	40	18	58	49	35	9	395
1869	59	85	123	2	46	82	33	5	435
1870	58	54	127	3	48	44	30	11	395
Average	101	103	100	24	70	88	48	15	549

So that the utmost range in the annual proportion of zymotic deaths to the total deaths is from 185 per 1,000, in the year which has just expired, to 240 per 1,000 in the cholera year of 1866—the average for the whole period being 202 per 1,000. The same fact is observable in all the large towns of England; and it shows that although there may be many notable fluctuations, year by year, in the intensity of certain specific diseases, yet the aggregate mortality from all causes remains at nearly the same point. In

the census years, for example, of 1841, 1851, and 1861, when the exact number of the population of England was known, the death-rates of the kingdom were 21·59, 21·99, and 21·63 per 1,000 of the population; and even upon the broader basis of a ten years experience, as during the last three decades, the average annual death-rate has been 22·37, 22·24, and 22·24 respectively—the mean death-rate for the whole time having been 22·4 per 1,000 of the people. At first sight this does not appear to be very encouraging to our sanitary labours, seeing how much has been done during the last thirty years for the purpose of improving the sanitary condition of the country; but careful observation has shown that wherever the dwellings of the poor have been improved, and overcrowding prevented—wherever the soil has been drained, and kept free from excremental pollution—and wherever unwholesome branches of industry have been ameliorated—there has been a marked diminution in the force of certain classes of diseases. The researches of Dr. Buchanan, for example, have exposed the fact—that by draining the subsoil of a town, and so diminishing the dampness of its atmosphere, the mortality from phthisis is invariably reduced; and the experience of every Officer of Health is to the effect that by freeing the soil from organic pollution, the force of endemic bowel complaints, and of typhoid fever and cholera is greatly

diminished. Small-pox, too, is a disease which is almost entirely within the control of prophylactic measures; and these are all encouragements for the continued prosecution of sanitary works.

The influence of season on the mortality from different diseases is shewn in the sixth table of the appendix; and it will be observed from the statistics of the last ten years, that hydrocephalus, infantile convulsions, measles, whooping-cough, and croup, have generally been most fatal in the spring quarters; while tabes-mesenterica, scrofula, alvine disorders, and scarlet-fever have been most severe in summer and autumn—phthisis, and inflammatory affections of the lungs, being the most marked diseases of winter.

The sickness returns for the year have been extracted from the books of the Union, and they are a little below the average for the last ten years, there having been a notable decrease of several important diseases, as, for example, continued-fever, which has declined from an average of 631 cases in the year to 439; diarrhœa from 960 to 527, and small-pox from 88 to 10; but scarlet-fever has advanced in severity, for last year there were 122 cases against an average of less than a hundred. At the beginning of the year fears were entertained of a probable severity of relapsing-fever, but only 10 cases of it are recorded in the parish medical books, and there have been no

registered deaths from the disease. It is very likely, therefore, that the timely warning of its approach enabled the guardians to apply successful preventive measures, as the disease is essentially due to poverty and want.

The chief facts connected with the meteorology of the year have been deduced, as usual, from the observations at Guildhall and at Greenwich—the former being under the superintendance of Mr. Haywood, and the latter of Mr. Glaisher.

Rainfall, Humidity, Dew-point, and Temperature, in each quarter of the year.

	Quarter ending Decembr 1869.	Quarter ending March 1870.	Quarter ending June 1870.	Quarter ending September 1870.	Entire year.
Total Rainfall (inches)	6·84	3·92	1·65	5·54	17·95
Ditto at Greenwich	6·62	4·42	1·29	5·50	17·83
Average in City for 10 years	6·39	6·08	5·91	6·09	24·47
Number of Wet Days	35	36	17	30	118
Ditto at Greenwich	34	37	16	27	114
Average in City for 10 years	42	48	41	38	169
Degree of Humidity (Sat = 100).	76	86	68	67	77
Ditto at Greenwich	85	81	71	75	78
Average in City for 10 years	84	84	77	74	80
Dew-point (Faht.)	40·2	36·5	48·2	51·6	44·1
Ditto at Greenwich	38·5	32·8	45·3	52·6	42·3
Average in City for 10 years	43·0	37·9	46·1	52·7	44·9
Temperature (Faht.)	48·1	40·8	55·0	63·0	51·7
Ditto at Greenwich	43·0	37·7	54 8	60·8	49·1
Average in City for 10 years	47·5	46·3	53·6	61·2	52·1

From this it will be seen that the mean temperature of the air in the city has been about half a degree below the average for the last ten years, and, as usual, it has been about 2·5 degrees above the mean temperature of Greenwich—the largest difference being in the Autumn quarter, when the mean temperature in the city was 48·1, that at Greenwich being 43·0. The average temperature at which dew has been deposited from the air has been 48·2 degrees in the Autumn quarter, 36·5 in the Winter, 48·2 in the Spring, and 51·6 in the Summer; and the degree of humidity has ranged from 68 (saturation being 100) to 86—the average for the whole year being 77, against a mean of 80 degrees for the last ten years. This comparative dryness of the atmosphere is referable to the small rainfall of the year, it having been but 17·95 inches, instead of 24·47; and the number of wet days has been 118 instead of 169. The first quarter of the year (that ending in December, 1869) was rather wetter than usual, but all the others have been drier—the total rainfall, for example, in the quarter ending in March, was but 3·92 inches, against an average of 6·08 inches, and that of the following Spring quarter was but 1·64, instead of 5·91. These circumstances have doubtless had their influence on the public health; for dry and warm seasons are nearly always salubrious.

As usual, the quality of the water supplied to the Metropolis during the year has been carefully analysed in the laboratory of the London Hospital; and the following are the average results:—

Average Chemical Composition of the Metropolitan Waters for the Year 1870.

Names of Water Companies, &c.	Total Solid Matter per gallon.	Common Salt.	Oxygen* required by Organic Matter, &c.	Nitrogen.		Hardness.	
				As Nitrates, &c.	As Ammonia.	Before Boiling	After Boiling
	Grains.	Grains.	Grains	Grains.	Grains.	Degrees.	Degrees.
Thames Water Companies.							
Grand Junction ..	18·53	1·68	0·078	0·076	0·002	14·2	3·7
West Middlesex ..	18·43	1·71	0·053	0·095	0·001	14·0	3·7
Southwark & Vauxhall	18·37	1·73	0·077	0·073	0·003	14·2	3·9
Chelsea	18·67	1·69	0·085	0·080	0·002	14·3	3·8
Lambeth	19·04	1·79	0·071	0.081	0·002	14·3	3·9
Other Companies.							
Kent	27·31	2·38	0·011	0·142	0·000	20·0	5·2
New River.....	18·31	1·61	0·024	0·086	0·000	14·0	3·5
East London.....	18·62	1·77	0·041	0·093	0·001	14·1	3·8

So that the range in the average compositions of the Metropolitan waters has been, in the case of the Thames supply, from 18·37 grains of solid matter per gallon to 19·04; while the New River water has averaged 18·31 grains per gallon, the River Lea 18·62 grains, and the water from the chalk wells 27·31 grains. The hardness of the general supply has been about 14 degrees, and this has been reduced by boiling to rather less than 4 degrees; but the chalk water has had an average hardness of 20 degrees before boiling, and 5·2 degrees after. As to the proportion of organic matter in the water, it has been very small, for the quantity of oxygen required to act on every description of oxydisable matter has ranged from only 0·011 of a grain per gallon to 0·085; and the proportions of ammonia, and of organic nitrogen have never reached beyond the one four thousandth part of a grain per gallon of water.

* The amount of oxygen required to oxidise the organic matter, nitrates, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the Metropolitan Waters the quantity of organic matter is about eight times the amount of oxygen required by it.

As public attention has been again directed to the question of supplying London with soft water, I have taken some pains to ascertain the comparative salubrity of the places in England and Scotland which are supplied with hard and soft water; and in addition to the 19 large towns, whose death-rates are constantly reported by the Registrar General, I have obtained from his office the average birth-rates and death-rates of many other cities and towns of England during the five years (1861—1866), and the general results of these inquiries are expressed in the following tables:—

Comparative Mortality in the Nineteen Large Towns of England and Scotland referred to in the Registrar General's Weekly Report for 1870, *arranged under the heads of Hard-water, and Soft-water Supply—*10 *degrees of hardness being taken as the standard.*

Hard-water Supply.			Soft-water Supply.		
Towns.	Rate per 1,000 of Population.		Towns.	Rate per 1,000 of Population.	
	Births.	Deaths.		Births.	Deaths.
London	35·3	24·1	Liverpool.....	37·0	34·1
Portsmouth...	31·4	20·1	Manchester....	36·6	27·8
Norwich	32·9	27·4	Salford.....	40·1	26·1
Bristol.....	38·5	29·9	Bradford.....	39·1	27·4
Wolverhampton	39·4	21·8	Leeds	40·2	28·1
Birmingham ..	35·2	21·1	Sheffield	39·5	25·3
Nottingham ..	31·4	24·1	Edinburgh	37·7	26·1
Hull..	33·7	21·8	Glasgow	41·3	29·5
Sunderland....	37·4	20·1	———	—	—
Nwestl-on-Tyne	38·2	24·1	———	—	—
Leicester	38·9	26·6	———	—	—
Average	35·7	23·7	Average	38·9	28·1

Ditto for England—Birth-rate, 36·0; Death-rate, 23·5.

But the results are still more striking when we take the averages of several years, as I have done in the following table, where the annual birth-rates and death-rates of 24 English and Scotch towns are classified for the years 1861 to 1865 inclusive:—

Comparative Mortality in 24 *English and Scotch Towns, during the years* 1861 *to* 1865 *inclusive, arranged under the heads of Hard-water, and Soft-water Supply—*10 *degrees of Hardness being the Standard.*

Hard-Water Supply.			Soft-Water Supply.		
Towns.	Rate per 1,000 of Population.		Towns.	Rate per 1,000 of Population.	
	Births.	Deaths.		Births.	Deaths.
London ..	34·76	24·39	Exeter ..	30·73	24·72
Guildford	30.29	19·45	Plymouth ..	34·06	22·56
Dover ..	32·81	20·96	Liverpool ..	35·98	36·41
Southampton..	34·85	22·11	Manchester..	36·71	31·89
Reading ..	35·12	22·19	Bradford ..	40·33	26·74
Bedford ..	32·60	20·72	Leeds ..	40.24	30·32
Ely	33·83	21·55	Sheffield ..	42·18	29·40
Chelmsford ..	31·71	19·83	Northampton	39·01	26·15
Gloucester ..	35·76	23·83	Carlisle ..	33·39	24·05
Cheltenham ..	26·98	18·52	Preston ..	37·60	26·63
Birmingham..	39·42	26·42	Edinburgh ..	—	26·73
Sunderland ..	41·30	23·99	Glasgow ..	—	30·90
Average ..	34.12	22·00	Average ..	37·02	28·04

England—Birth-rate, 35·26; Death-rate, 22·68.

In the former table, the soft water districts gave a death-rate of 28·1 per 1,000 of the population, against an average of only 23·7 in the hard water; and in the last table it stands as 28·04 per 1,000, to 22·00. In point of fact, after making every allow-

ance for the differences of birth-rates in the two cases there is a large excessive mortality in the soft water districts. This is quite in accordance with the facts which I submitted to your notice in in my last annual report, and it is sufficiently striking to command attention.

The average daily quantity of water supplied to the metropolis during the year by the several water companies was 103,325,660 gallons; and it ranged from an average of 93,650,519 gallons per day in December, 1869, to 116,293,521 gallons per day in June last. The average number of houses supplied was 477,262; and the particulars relating to this, as furnished to me by the Companies for the information of the Medical Officers of Health of London, as well as the particulars of the water supply of Paris, so far as they have been received, are as follows :—

Average amounts of Water supplied daily to London and Paris during each Month of the Year ending September 1870.

Year ending September 1870.	London (estimated Population, 3,214,707.)			Paris (Population 1,889,842).	
	Gallons per day.		Number of Houses supplied	Gallons per day.	
	Total.	Per Head.		Total.	Per Head.
October	103,363,482	32·6	469,504	49,175,047	26·0
November	97,329,081	30·7	473,876	49,730,249	26·3
December	93,650,519	29·5	474,010	48,313,766	25·7
January	94,878,164	29·9	476,549	46,471,089	24·5
February	95,812,688	30·1	476,863	43,487,306	23·0
March	96,741,741	30·5	477,230	48,138,675	25·4
April	101,500,945	31·6	478,079	53,576,869	28·3
May.....	107,540,811	33·3	478,308	55,332,198	29·3
June	114,754,281	35·7	479,934	—	—
July	116,293,521	36·2	480,932	—	—
August	111,719,750	34·8	481,199	—	—
September	106,322,943	33·1	481,660	—	—
Average	103,352,660	32·1	477,262	—	—

Another subject of considerable interest, namely, the constant supply of water in London, is also occupying public attention at the present time, and it may not be out of place to review the facts on both sides of this important question.

That a constant service would be a great boon to the poor is admitted on all hands, for the filthy condition and exposed situation of their water receptacles is almost always such as to render the

water foul and offensive; besides which, they are so constantly in a dilapidated state that they rarely hold sufficient water from day to day. This has been a matter of considerable anxiety to my predecessor, Mr. Simon, and to myself from the very beginning of our office, and it has been the subject of frequent reports to you. As far back as the year 1849 Mr. Simon remarked that "in inspecting the courts and alleys of the City, one constantly sees butts for the reception of water either public or in the open yards of houses, or sometimes in their houses; and these butts, dirty, mouldering, and coverless, receiving soot and all other impurities from the air, absorbing stench from the adjacent cesspool, inviting filth from insects, vermin, sparrows, cats, and children, their contents often augmented through a rain-water pipe by the washings of the roof, and every hour becoming fustier and more offensive." At the present time, with all the improvements that have been made since Mr. Simon wrote, this is frequently the state of the water receptacles in the City; and no sanitary supervision can prevent it while the present intermittent supply of water to the houses of the poor, with the intermedium of the filthy butt, exists. I have been at great pains to examine chemically and microscopically the quality of the water in some of the worst of these receptacles; and although the dissolved impurities have not been so large as I had expected,

yet the filthy matters which composed the insoluble deposit were in the highest degree offensive—confirming in a most unmistakeable manner the conclusion of the Select Committee appointed by Parliament to inquire into the Metropolitan Water Bills for 1867, that "the use of cisterns for the purpose of storing water for consumption is probably a more fertile cause of impurity than any pollution of the river from which the water is drawn." So forcibly was I impressed with this when I gave my evidence before the Royal Commission on Water Supply in 1868, that, in reply to the chairman as to my views respecting a constant service in London, I said that, "as an abstract question, there can be no doubt that the constant supply is a very advantageous thing to the public, chiefly because they would get their water cooler, more grateful, less liable to the pollution to which it is now subject after it is delivered by the water companies; and if the question really turned upon the state of the water in poor people's houses, I should say that the constant supply to them, whether it be in a court by a stand-pipe, or whether it be in their own yards by a stand-pipe, would be a boon, the good of which is hardly to be calculated." Having regard for this matter, I have earnestly endeavoured to abolish the cisterns and butts in the houses of the poor of the City, by advising that they should be replaced by a

constant service from the mains of the water companies; and in this endeavour I have met with the most cordial co-operation from the two companies which supply the City with water; but in no case have I been able to overcome the objections of landlords, who fear the expense of a novel contrivance; and it is unfortunate that your legal powers do not enable you to prescribe the mode whereby such water should be furnished. In the year 1866, when cholera was prevalent in the eastern part of the City, your sanitary committee, acting on my advice, distributed among the landlords of all the poorer dwellings in the City a notice respecting the dangers of the present system of supply, and asking them to adopt the more wholesome, and in the end less expensive, method of supplying water to their tenements directly from the mains; at the same time informing them that the New River Company were ready to supply the inhabitants with water for drinking and other purposes, by means of a stand-post in each house, or in the courts, on condition that the same was provided with some effective apparatus to prevent waste—the cost of which would be much less than that of erecting separate cisterns; and with the view of demonstrating the advantages of this method of supply, the Commissioners erected at their own cost 18 of such stand-posts, with waste-water preventers, in various parts of the City; but nowhere,

except in the quarter occupied by the Jewish poor, was this example followed. Two years after this the matter was again brought into public notice, by a report from the engineer and myself, prepared at your request, to show the advantages of the system. At that time there were 27 of these stand-posts, with waste-water preventers, in the City—18 of which had been provided and maintained by the Commissioners, and 9 by the Jewish Board of Guardians; and the two years experience of their usefulness had been so conclusively satisfactory to us, that we recommended their employment by the landlords of the poorer class of dwellings, wherever it was practicable; but, as in the last case, the recommendation was abortive. Very recently, in consequence of a communication from the Gas and Water Committee of the corporation, the matter has been again discussed, and we have ascertained from the New River Company that in consideration of the importance of the subject, they are prepared to lay down at their own expense a constant service into every court occupied by the poor of the City, and to provide the necessary waste-water contrivance (which will cost in each case about £2), at a rental of six per cent. on the outlay—the landlord being under the obligation to keep it in repair. It is hardly possible to meet the question in a more liberal spirit, and yet I fear, from the prejudices of landlords, which statu-

tory powers do not enable you to deal with, that this much desired change will not be effected. I am, however, informed by Mr. Liddle, the medical officer of health of Whitechapel, that there are 92 of these stand-pipes with waste-water-preventers in his district, affording a constant supply of water to upwards of 7,000 poor people, and that numerous houses occupied by the poor of the district have for years past been furnished with a small pipe in connection with the main which delivers a constant supply to the house tap—to the great comfort of the tenants, and without loss of water to the Company.

But although the supply of water by constant service to the poor is admitted on all hands to be a pressing necessity, there are grave doubts on the subject of its general applicability to all classes of the metropolis; for it would involve such a complete change in the present arrangement of fittings, pipeage, and all other appliances, as to be both difficult and costly. Besides which, it would require a system of supervision and interference which would hardly at first be tolerated. That the public are not in want of this change is manifest from the circumstance that they do not ask for it, and that practically they consider the supply already constant. By the fifteenth section of the Metropolis Water Act of 1852, the water companies are bound to provide a constant service, reaching to the top storey of the houses,

whenever four-fifths of the inhabitants of a district, or rather, of the occupiers of the houses require such supply, and put their pipes, cocks, and other fittings for the distribution of water into a proper condition to receive it; and it is a very significant fact that no such requisition has ever been made to the water companies. It is very doubtful, indeed, whether, if the sense of the public were taken on this important question, any such a change from the present system would be either required or sanctioned. That, perhaps, which would be agreed to by the public would be some provision for the future, as regards a constant service, when practicable, to newly-built houses, or to houses undergoing re-construction; for, doubtless, as I have already said, a well regulated constant service is preferable to the intermittent, and would be adopted but for the expense and serious inconvenience attending the change. That there is no lack of water at the present time is shown by the returns of the water companies; the supply to each house during the year which has just expired having been at the rate of 217 gallons daily, or 32·3 gallons per head of the whole population; and this is largely in excess of what is generally considered necessary for all public, domestic, and manufacturing purposes. In answer to this it may be said that the distribution of the water, as at present conducted, is unequal, and that the waste is enormous; but all experience

shows that even with the constant service the same difficulties occur, unless the supervision of houses is vigilant, strict, and constant. At Glasgow, for example, the waste of water is frightful, and at Manchester, where the system is said to work so well, the corporation are frequently obliged to caution the inhabitants against waste, and to threaten legal proceedings. In every place, in fact, where the constant service is in operation, the most stringent rules and regulations are in force concerning the quality of the pipes, the description of tap, and the situation and construction of cisterns and waste water-pipes—over all of which the Company or local authority supplying the water, must have absolute control. I have before me the regulations in force at Norwich, Sheffield, and Rochdale, which substantially represent the rules at other places, where the service is constant, and they are, in my opinion, more severe than any authority in London could easily put into operation; for if such power were given to the companies, it would be thought excessive and arbitrary, and if confided to the local authority, it would, as elsewhere, be disregarded. However desirable, therefore, it may be to change the present intermittent system of supply in London for a constant service, the difficulties of the case are so serious as to require the fullest sanction of the public before it is attempted.

As regards the sanitary work of the City during the year, there have been 18,305 inspections of houses, 1,536 of which required sanitary improvement; so that 1,191 orders have been issued for cleansing and lime-whiting; 19 for erecting and repairing dust-bins; 75 for paving cellars and yards; 120 for amending the water supply; 22 for removing cesspools; 346 for repairing sinks and drains; 48 for removing waste-water; 467 for cleansing and repairing privies; 24 for abating smoke nuisance; and 76 for various other kinds of sanitary work—making a total of 2,388 orders for the sanitary improvement of the dwellings of the poor; besides which, 2,937 notices were served by the inspectors on the owners of the lodging-houses of the City, requiring them to cleanse and lime-white the walls and ceilings in accordance with the regulations of the Sanitary Act of 1866; and there were 1,997 inspections of ships in the City division of the port of London, 29 of which required and received sanitary improvement. 260 inspections have also been made of the bakehouses of the City, and 30 notices served for cleansing and lime-whiting. The particulars of these inspections are shown in the Eighth Table of the Appendix, and the following shows the work of each inspector :—

Names of Inspectors.	Number of houses inspected.	Number requiring amendment.	Number of orders issued.	Number of notices to lodging houses.
William Clark - - -	3,513	265	346	750
Job Payne - - - -	5,170	480	921	687
Thomas Saltmarsh - -	5,105	364	527	750
Thomas Shurmur - -	5,017	427	594	750
Total - - - -	18,805	1,536	2,388	2,937

The Inspectors of the Markets and Slaughter-houses have seized and condemned 126,109 lbs., or rather more than 56 tons of meat as unfit for human food: and of this quantity, 54,408 lbs. were putrid, 57,532 lbs. were diseased, and 14,169 lbs. were from animals that had died from accident or disease. It consisted of 575 sheep and lambs, 242 pigs, 114 calves, 590 quarters of beef, 2,885 joints of meat, and many hundred heads, plucks, hearts, tongues, kidneys, and livers; besides 600 tins of preserved beef, 1 case of rabbits, 13 deer, 12 quarters of venison, 175 hares, 372 rabbits, 532 head of game and poultry, 2 turtles, and 15½ chests of unsound tea, all of which were destroyed.

In Billingsgate Market the fish meters appointed by the Fishmongers' Company have seized and condemned on account of putridity 808,243 fish, chiefly haddock, plaice, smelts, whiting, herrings, soles, dabs, and thornbacks; besides 8,186 gallons of

shrimps, 498 bushels of whelks, 1,081 bushels of periwinkles, 180 bushels of mussels, 70 bushels of sprats, and large quantities of oysters, salmon, eels, and whitebait. By far the largest proportion of the fish condemned in the market was brought to London by railway.

Lastly, I have to report that eleven persons have been convicted by the Magistrates of the City during the year of having sent diseased meat to the City markets for sale as human food, and they have been fined in various sums from five pounds to twenty together with the costs of the proceedings. Two persons have been sentenced to imprisonment without the option of a fine; and the following are the particulars of these cases:—

The Prosecutions and Convictions during the Year for sending Diseased Meat to the City Markets for sale as food.

1.—Walter Dunham, *Butcher*, of Harleston, Norfolk.—Fined £20 and costs.

2.—Francis Marsh, *Butcher*, of Head Hill, Glastonbury, Somerset.—Fined £10 10s. and costs.

3.—John Leonard, of Soham, Cambridge.—Fined £5 and costs.

4.—John Moore, *Butcher*, of Attleborough, Warwick.—3 Months' Imprisonment.

5.—Joseph Rye, *Farmer*, of Irthlingborough, near Higham, Ferrers, Nottingham.—Fined 15 guineas and costs.

6.—Henry Morris, *Butcher*, of Queen's Road, Chelsea.—Fined £20 and costs.

7.—William Dunnett, *Butcher*, of Grundisburgh.—Fined £5 and costs.

8.—Charles Fisher, *Butcher*, of Mark, Somerset.—2 Months' Imprisonment.

9.—Israel Clark, *Butcher*, of Standford, near Farringdon, Berks.—Fined £5 and costs.

10.—Henry Killborn, *Butcher*, of Loddington, Northamptonshire.—Fined £5 and costs.

11.—Thomas Fisher, *Knacker*, of East Dereham.—Fined £20 and costs.

I remain, Gentlemen,

Your obedient servant,

HENRY LETHEBY.

Guildhall, *January 10th*, 1871.

No. I.—*Enumeration of Births, Deaths, and Marriages in each of the City Unions for the Year ending September* 1870, *and a Comparison with the Averages of the last Ten Years.*

Quarters Ended.	East London Union.			West London Union.			City of London Union.			Extra City.		
	Births.	Deaths.	Marriages.	Births.	Deaths.	Marriages.	Births.	Deaths.	Marriages.	Births.	Deaths.	Marriages.
December 1869	220	232	92	132	137	92	140	164	142	492	533	326
Average of 10 Quarters.	289	248	134	170	173	129	213	219	143	678	640	406
March 1870	272	225	—	131	156	—	132	200	—	535	581	291
Average of 10 Quarters.	309	273	103	183	200	96	223	207	135	715	730	334
June 1870	225	194	—	125	118	—	122	167	—	472	479	324
Average of 10 Quarters.	291	237	129	171	170	110	207	207	147	669	614	386
September 1870	228	182	—	117	102	—	122	148	—	497	432	299
Average of 10 Quarters.	289	239	114	163	155	116	204	196	163	686	660	383
Sum of the 4 Quarters...	945	833	—	565	513	—	646	679	—	1996	2025	1350
Average of 10 Years.	1158	997	480	693	698	451	847	879	578	2698	2574	1569

No. II.—*Annual Enumeration of Births for the Year ending September* 1870.

Births in the Four Quarters.	Total.	East London Union.			West London Union.			City of London Union.						
		Saint Botolph.	Cripplegate.	Total.	Saint Sepulchre.	Saint Bride.	Total.	Castle Baynard	Christ-Church.	Queenhithe.	Allhallows Barking.	Broad Street.	Total.
Quarter ending Dec. 1869	M. F. 247 245 492	M. F. 61 57 118	M. F. 52 50 102	M. F. 113 107 220	M. F. 20 29 49	M. F. 41 42 83	M. F. 61 71 132	M. F. 7 9 16	M. F. 16 18 34	M. 17 F. 8 25	M. F. 17 16 33	M. F. 16 16 32	M. F. 73 67 140
Quarter ending March 1870	281 254 535	69 85 154	67 51 118	136 136 272	22 26 48	46 37 83	68 63 131	8 7 15	12 8 20	17 8 25	15 14 29	25 18 43	77 55 132
Quarter ending June 1870	229 243 472	62 64 126	41 58 99	103 122 225	25 26 51	37 37 74	62 63 125	9 9 18	7 12 19	17 12 29	8 8 16	23 17 40	64 58 122
Quarter ending Sept. 1870	257 240 497	58 55 113	62 53 115	120 108 228	20 23 43	36 38 74	56 61 117	23 11 34	11 11 22	12 1 24	17 13 30	18 24 42	81 71 152
Sum of the Four Quarters	1014 982 1996	250 261 511	222 212 434	472 473 945	87 104 191	160 154 314	247 258 505	47 36 83	46 49 95	73 40 113	57 51 108	82 75 157	295 251 546
Annual Average of the last Ten years	1378 1325 2698	313 295 608	278 272 550	591 567 1158	154 152 306	197 190 387	351 342 693	81 85 166	68 60 128	84 85 169	82 76 158	116 110 276	431 416 847

No. III.—*Annual Enumeration of Deaths for the Year ending September* 1870.

Deaths in the Four Quarters.	Total.	East London Union.			West London Union.			City of London Union.					
		Saint Botolph.	Cripplegate.	Workhouse.	Saint Sepulchre.	Saint Bride.	Workhouse.	Castle Baynard	Christ-Church.	Queenhithe.	Allhallows Barking	Broad Street.	Workhouse.
Quarter ending Dec. 1869	M. F. 266 267 533	M. F. 51 56 107	M. F. 44 56 100	M. F. 4 21 25	M. F. 20 19 39	M. F. 41 32 73	M. F. 8 17 25	M. F. 12 10 22	M. F. 17 14 31	M. F. 14 4 18	M. F. 19 8 27	M. F. 23 15 38	M. F. 13 15 18
Quarter ending March 1870	285 296 581	50 55 105	43 47 90	20 10 30	25 24 49	37 38 75	15 17 32	9 15 24	11 16 27	19 14 33	21 16 37	16 1 37	19 23 42
Quarter ending June 1870	247 232 479	52 37 89	39 40 79	13 13 26	19 27 46	29 24 53	10 9 19	11 9 20	6 13 19	17 15 32	17 13 30	13 19 32	21 13 34
Quarter ending Sept. 1870	209 223 432	35 31 66	41 46 87	13 16 29	19 14 33	18 31 49	11 9 20	8 13 21	8 8 16	10 7 17	15 12 27	14 17 31	17 19 36
Sum of the Four Quarters	1007 1018 2025	188 179 367	167 189 356	50 60 110	83 84 167	125 125 250	44 52 96	40 47 87	42 51 93	60 40 100	72 49 121	66 72 138	70 70 140
Annual Average of the last Ten years	1340 1234 2574	220 227 447	224 211 432	61 57 118	126 105 231	177 158 335	78 54 132	68 62 130	66 52 118	76 70 146	83 64 147	92 94 186	72 80 152

No. IV.—*Classification of Deaths in the City Unions according to Age, for the Year ending September.* 1870, *and a Comparison with the Averages of the last Ten Years.*

City Districts.	Total.	Under 1.	Under 5.	5 to 10.	10 to 15	15 to 20	20 to 30	30 to 40	40 to 50	50 to 60	60 to 70	70 and over.
East London Union, 1870	833	179	349	39	19	20	44	55	59	72	83	93
Average of Ten Years ..	997	204	416	41	13	19	55	68	84	89	103	109
West London Union 1870	513	95	182	25	9	14	25	43	55	50	38	72
Average of Ten Years ..	698	132	267	25	11	15	44	58	63	70	73	72
City of London Union, '70	679	88	173	31	10	19	49	39	65	77	91	125
Average of Ten Years ..	879	129	261	31	17	21	53	62	84	93	118	139
Entire City, 1870	2025	362	704	95	38	53	118	137	179	199	212	290
Average of Ten Years ..	2574	465	944	97	41	55	152	188	231	252	294	320

No. V.—*Classification of Deaths according to Causes, during the Year* 1870; *and a Comparison with the Averages of the last Ten Years.*

City Districts and Population in 1861.		Violence, Privation, Premature Birth, and Poison.	Tubercular Diseases			Convulsions and Teething.	Zymotic Diseases.								Pneumonia, Bronchitis, and Asthma.	Others, chiefly chronic.	Total.
			Phthisis.	Tabes and Scrofula.	Hydrocephalus.		Alvine Flux.		Continued Fever.	Scarlet Fever.	Small Pox.	Measles.	Whooping Cough, Croup, & Diphtheria.	Erysipelas.			
							Adults.	Children.									
East London Union (Population 41,282)	1870	29	98	65	13	64	9	17	31	56	2	21	38	6	145	239	833
	Average	46	131	67	23	59	12	34	42	42	8	32	61	6	162	272	997
West London Union (Population 25,739)	1870	29	74	27	11	43	1	17	7	32	0	9	13	4	84	162	513
	Average	43	91	49	15	37	7	16	26	21	6	22	33	4	120	208	698
City of London Union ..... (Population 46,451)	1870	44	81	25	7	27	3	11	16	39	1	18	23	1	122	261	679
	Average	59	113	42	12	49	11	14	33	27	7	17	41	4	143	307	879
Entire City ..... (Population 114,472	1870	102	253	117	31	134	13	45	54	127	3	48	74	11	351	662	2025
	Average	148	335	158	50	145	30	64	101	90	21	71	135	14	425	787	2574

No. VI.—*Classification of Deaths according to causes, during the four quarters of the Year* 1870; *and a Comparison with the averages of the last Ten Years.*

Quarters Ending.	Violence, Privation, Premature Birth, and Poison.	Tubercular Diseases.			Convulsions and Teething.	Zymotic Diseases.								Pneumonia, Bronchitis, and Asthma	Others, chiefly chronic.	Total.
		Phthisis.	Tabes and Scrofula.	Hydrocephalus.		Alvine Flux.		Continued Fever.	Scarlet Fever.	Small-Pox.	Measles.	Whooping Cough, Croup, & Diphtheria.	Erysipelas.			
						Adults.	Children.									
December 1869	25	52	36	9	26	2	5	17	67	0	8	24	1	91	170	533
Average of Ten Years.	37	86	37	10	35	8	9	27	33	4	17	28	4	113	192	640
March 1870	34	71	27	9	34	1	2	18	27	1	4	27	3	143	180	581
Average of Ten Years.	42	88	34	14	39	2	3	26	17	7	17	38	3	160	240	730
June 1870.....	21	62	23	8	49	3	5	10	14	0	33	14	2	89	164	479
Average of Ten Years.	35	87	35	16	38	2	7	24	15	7	19	41	3	104	181	614
September 1870	22	68	31	5	34	7	33	9	19	2	3	9	5	37	148	432
Average of Ten Years.	34	74	52	10	33	18	45	24	25	3	18	28	4	48	174	590
Entire Year.....	102	253	117	31	134	13	45	54	127	3	48	74	11	351	662	2025
Average of Ten Years.	148	335	158	50	145	20	64	101	90	21	71	135	14	425	787	2574

VII.—*Meteorology of the City of London for each Month in the Year ending in September* 1870, *from Observations at the Engineer's Office, Guildhall, under the direction of Mr. Haywood.*

1869-70. MONTHS.	Barometer.			Dry Thermometer.				Wet Thermometer or Hygrometer.					Rain Gauges.					
								Mean Temperature.					Total Fall.		Greatest Fall.		Lowest Fall.	
	Mean Pressure.	Highest Pressure.	Lowest Pressure.	Mean Temperature.	Highest Temperature.	Lowest Temperature.	Mean Daily Range.	Dry Bulb.	Wet Bulb.	Dew Point.	Degree of Humidity.	Weight of vapour in a cubic foot of air.	On Grnd.	51 ft. above Grnd.	On Grnd.	51 ft. above Grnd.	On Grnd.	51 ft. above Grnd.
	Inches.	Inches.	Degrees.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.		Grns.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
October ..	29·878	30·508	29·398	51·4	70·5	33·1	9·5	51·4	48·0	44·5	78	3·4	1·93	1·97	0·71	0·75	0·01	0·01
November.	29·858	30·536	29·592	45·3	57·5	33·9	8·3	45·3	42·6	39·5	80	2·8	0·7	2·35	2·23	1·00	0·94	0·01	0·01
December .	29·741	30·570	29·350	41·5	56·5	26·9	7·9	41·5	39·3	36·5	84	2·5	0·5	2·27	2·38	0·61	0·64	0·03	0·03
January ..	29·929	30·628	29·126	40·6	52·3	27·9	6·8	40·6	38·5	35·8	83	2·4	0·5	1·44	1·42	0·27	0·27	0·03	0·02
February..	29·776	30·370	29·366	37·4	54·5	22·9	8·6	37·4	36·2	34·6	89	2·3	0·3	0·79	0·70	0·20	0·20	0·02	0·02
March	29·630	30·442	29·562	41·8	58·4	31·5	7·8	41·8	40·3	39·0	89	2·9	0·4	1·94	1·80	0·87	0·84	0·01	0·01
April.....	30·058	30·500	29·500	50·1	70·0	34·4	14·3	50·1	49·0	47·8	93	3·8	0·3	0·34	0·32	0·16	0·14	0·01	0·01
May	30·007	30·420	29·474	54·4	78·0	38·9	15·3	54·5	50·4	46·5	74	3·6	1·2	0·70	0·70	0·23	0·23	0·01	0·01
June.....	30·004	30·488	29·724	62·1	82·0	47·4	14·8	62·2	55·7	50·2	65	4·0	2·2	0·56	0·56	0·29	0·29	0·02	0·02
July	29·933	30·324	29·688	65·8	83·0	51·9	14·8	65·8	59·9	55·0	69	4·8	2·2	1·43	1·47	0·58	0·63	0·01	0·01
August....	29·961	30·320	29·766	62·2	76·5	50·9	11·7	62·2	55·9	50·4	66	4·0	2·2	2·09	2·09	0·84	0·84	0·01	0·01
September.	29·992	30·542	29·392	57·5	69·5	47·5	11·7	57·4	53·3	49·5	74	3·9	1·2	1·97	1·97	0·67	0·67	0·03	0·03

Barometer.—The highest readings were on October 22, November 18, December 6, January 18, February 12, March 28, April 16, May 26, June 7, July 20, August 13, September 16. The lowest readings were on October 18, November 6, December 13, January 8, February 24, March 3, April 9, May 12, June 10, July 11, August 4, September 7.

Temperature.—The highest were on October 9, November 16, December 18, January 7, February 28, March 2, April 21, May 22, June 16, July 22, August 14, September 28. The lowest were on October 28, November 11, December 28, January 28, February 12, March 14, April 1, May 3, June 7, July 2, August 3., September 26.

Rain.—The greatest fall on October 19, November 29, December 17, January 1, February 9, March 4, April 11, May 12, June 17, July 26, August 29, September 7. The least fall on October 15, November 11, December 31, January 18, February 24, March 8, April 28, May 3, June 20, July 11, August 24, September 3.

H. G. HAYWOOD, for W. HAYWOOD,
12*th November*, 1870.

No. VIII.—*Account of the Sanitary Work performed in the City during the Year* 1870; *and comparison with the averages of the last three years.*

Quarters Ending.	Number of Houses Inspected.	Number of Houses requiring Amendment.	Total Number of Orders Issued for Sanitary Improvement.	PARTICULARS OF THE ORDERS ISSUED. For Cleansing and Lime-washing Rooms.	For Forcing and Repairing Drainage.	For Paving Cellars and Yards.	For Amending the Water Supply.	For Removing Cesspools.	For Amending Sinks and Drains.	For Removing Waste-Water.	For Cleansing and Repairing Privies.	For Improving the Ventilation.	For Abating Smoke.	For Removing Animals Improperly Kept.	Sundry other Sanitary Orders.	Number of Ships Inspected.	Number of Orders issued for Improvement of Ships.
December 1869	4970	559	881	522	3	35	43	7	94	18	119	0	6	0	24	395	7
Average	5051	566	826	351	27	31	94	3	94	14	117	0	2	5	99	503	27
March 1870	4759	353	496	207	5	9	35	12	104	18	92	0	2	2	17	580	13
Average	6923	998	1437	791	29	81	121	3	121	26	232	1	1	10	61	500	21
June 1870.....	3974	363	595	291	6	3	14	2	68	7	186	2	8	0	10	561	5
Average	6483	1439	2409	1683	26	41	120	6	124	23	317	4	7	7	57	510	14
September 1870 ,...	5102	261	416	171	5	28	28	1	80	5	70	1	6	1	20	461	4
Average	6130	809	1218	760	18	34	56	7	111	16	169	2	10	4	37	554	10
Entire Year	18805	1536	2388	1191	19	75	120	22	346	48	467	3	24	3	71	1997	29
Average	24587	3812	5890	3575	100	187	391	19	450	79	835	7	21	23	254	2067	72

Total number of Houses Inspected in 1870.....18305. Requiring Amendment, 1536.
Average ,, ,, ,, 10 years ....14434. ,, ,, 2990.

No. IX.—*Quarterly Account of the Meat condemned in the City Markets during the Year* 1870, *and comparison with the Averages of the last Ten Years.*

	WHERE CONDEMNED, AND WHY CONDEMNED.															
	New Market.				Aldgate Market.				Leadenhall Market.				Total.			
	Dead.	Diseased.	Putrid.	Total.	Dead.	Diseased.	Putrid.	Total.	Dead.	Diseased.	Putrid.	Total.	Dead.	Diseased	Putrid.	Total.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
December 1869	2357	10232	8437	21026	35	485	—	520	—	—	100	100	2392	10717	8537	21646
Average of 10 Quarters	6687	20111	8625	35423	582	1584	260	2426	465	3182	2138	5785	7734	24877	11023	43634
March 1870	5012	16077	3839	24228	—	208	—	208	—	—	560	560	5012	16285	3699	24996
Average of 10 Quarters	4472	25231	4136	33739	538	1770	171	2479	877	3236	2456	6619	5887	30287	6763	42937
June 1870.....	3930	20020	14189	38139	480	45	35	560	—	—	—	—	4410	20065	14224	38699
Average of 10 Quarters	6241	19969	14330	40540	685	1796	273	2754	649	4241	3016	7906	7575	26006	17619	51200
September 1870	2299	9655	27852	39806	56	810	96	962	—	—	—	—	2355	10465	27948	40768
Average of 10 Quarters	3050	20030	36151	59331	799	3034	1093	4926	869	1872	7696	10437	4718	24936	44940	74594
Entire Year.....	13598	55984	53617	123199	571	1548	131	2250	—	—	660	660	14169	57532	54408	126109
Average of 10 Years ..	20450	85341	63242	169033	2604	8184	1797	12585	2860	12581	15306	30747	25914	106106	80345	212365

It consisted of 575 Sheep, 114 Calves, 242 Pigs, 590 quarters of Beef, and 2,885 Joints of Meat; besides 1,102 Plucks, 407 Kidneys, 609 Tins of Preserved Beef, 1 Case of Rabbits, 13 Deer, 12 Quarters of Venison, 175 Hares, 372 Rabbits, and 532 Head of Game and Poultry.

No. X.—*Quarterly account of the Fish condemned by the Fish-meters in Billingsgate Market, during the Year* 1870.

	Quarter ending Dec. 1869.	Quarter ending March 1870.	Quarter ending June 1870.	Quarter ending Sept. 1870.	Entire Year.
Dabs	500	..	1863	9120	11483
Plaice	9446	5867	61307	42988	119608
Whiting	28880	372	1300	36040	66592
Gurnets	800	..	59	..	859
Haddocks	8559	4416	13118	102860	128953
Herrings	7790	12915	33193	138935	192833
Thornbacks	611	198	934	2484	4227
Smelts	144297	50550	30200	2400	227447
Cod	450	200	272	247	1169
Soles	2086	22	358	2816	5282
Various Fish	10264	247	5932	19290	35733
Lobsters and Crabs	2722	..	3234	8100	14056
Total	216495	74787	151770	365280	808242
Sprats ....(bushels)..	38	30	2	..	70
Oysters .... ,, ..	..	..	..	4	4
Periwinkles. ,, ..	68	..	519	503	1081
Shrimps....(gallons)..	647	52	3134	4353	8186
Whelks....(bushels)..	21	154	154	189	498
Mussels .... ,, ..	78	4	80	18	180

Besides which there were 3542 lbs of Eels and 30 lbs of Salmon

Note.—Of the 808242 Fish condemned in the year, 637780 were brought by railway, and 170462 by water.

No. XI.—*List of Slaughter-houses in the City of London*, 1870.

East District.	West District.
No. 44, Aldgate High Street	No. 70, Fetter Lane
45, ,, ,,	117, Fore Street
46, ,, ,,	82, Aldersgate Street
48, ,, ,,	Paved Passage
51, ,, ,,	No. 4, Hosier Lane
52, ,, ,,	4, Warwick Lane
53, ,, ,,	6, ,,
55, ,, ,,	10, ,,
56, ,, ,,	6, Newgate Market.
57, ,, ,,	9, ,,
58. ,, ,,	10, ,,
59, ,, ,,	25, ,,
60, ,, ,,	26, ,,
62, ,, ,,	27, ,,
66, ,, ,,	28, ,,
67, ,, ,,	
68, ,, ,,	
68, ,, ,,	
68, ,, ,,	
68, ,, ,,	
69, ,, ,,	
70, ,, ,,	
73, ,, ,,	
74, ,, ,,	
75, ,, ,,	
Harrow Alley	
No. 53, Minories	
63, ,,	
154, Bishopsgate Street	
123, ,, ,,	
Gun Yard, Norton Folgate	

East District 31
West ,, ... 15
Total 46

With C.10 Bs
Compliments

REPORT

ON

THE SANITARY CONDITION

OF

BIRKENHEAD,

For the Year 1871.



BY

C. O. BAYLIS, M.D., M.R.C.S., &c.

MEDICAL OFFICER OF HEALTH FOR BIRKENHEAD.

BIRKENHEAD:
WILLMER, STEAM PRINTER, 64 AND 66, CHESTER STREET.
1872.

No. XII.—*List of Cow-houses in the City of London, and Number of Cows kept.* 1870.

East District.			West District.		
Name of Owners.	Situation.	No. of Cows.	Name of Owners.	Situation.	No. of Cows.
W. Andrews	Garden Court	11	W. Reeder	Whitefriars Street	3
Smith	" "	4	W. Phillips	New Street Hill	2
T. Davies	St. James' Place	15	— Rowland	Bartholomew Close	6
J. Roberts	Half Moon Mews	4	W. Goodman	Bridgewater Square	12
T. Tatlams	" " "	2	H. Elmes	" "	5
M. Nelmes	George Yard	1			
M. Evans	Wildgate Street	10			
No. of Cow-houses	7	No. of Cows	47	No. of Cow-houses 5	No. of Cows 28

Total Cow-houses..... 12 Total No of Cows..... 75

HEALTH COMMITTEE

OF THE

BIRKENHEAD COMMISSIONERS

FOR 1871-72.

BRAITHWAITE POOLE, JUN., ESQ., CHAIRMAN.

MR. FREDERICK FORREST.

„ ROBERT SPENCER SHIELD.

„ WILLIAM WALKER.

„ JOHN RANDALL WILLIAMS.

THE SANITARY STATE

OF

BIRKENHEAD (AND CLAUGHTON,)

DURING 1871.

REPORT OF THE MEDICAL OFFICER OF HEALTH TO THE HEALTH COMMITTEE.

The Death Rate computations of the previous year were deferred till the census of the succeeding April afforded the final element of enumerated population requisite for complete exactness and reliability. The result gave the Death Rate of Birkenhead (and Claughton) at 19 per 1000 per annum, and marked the year as yielding the lowest ratio of mortality in a continuous series of seven, during which the rate declined from 24.3 in 1864, when the medical department was instituted, to 19.0 per 1000 per annum in 1870. This great and generally progressive improvement is now to be found abruptly reversing itself.

DEATHS AND DEATH RATE.

The number of deaths registered during 1871 amounted to 1137, of which 587 were males, and 550 were females. The total number of 1137 deaths, out of a population of 45,216* in the middle of the year, gives the Death Rate at 25.1 per 1000. This Death Rate exceeds that of the previous year by 6.1 per 1000, and the corrected average Death Rate of the previous 7 years by 3.8 per 1000.

INCREASE OF MORTALITY.

This rise in the mortality of the year goes much beyond the limits of ordinary variation, and indicates some unusual potentiality of death

* Note—Census number of April, 1871=45,034 + 3 months increase to middle of year, proportionate to that between 1861 and 1871, viz., 181=45,215.

causes either in common with the whole or part of the country; or limited to the district or locality itself. That the increase is not shared in common with the whole country, or with either of its two large but differing populations, is shown by the following comparisons, in which, first, the Death Rate of Birkenhead, after running closely with the average of the country districts, is found suddenly rising to the higher average of the town ones; and, second, its Death Rate is found to have greatly risen since the previous year, while that of all England has diminished. Some cause of specific or local origin is, therefore, strongly indicated.

Comparison of Death Rates.

	Birkenhead.	Country Districts.*	Town Districts.*	All England.*
1864	24.4	20.9	26.1	
5	21.4	20.4	25.5	
6	22.4	19.6	26.4	
7	20.8	19.0	23.9	
8	21.0	18.7	24.4	
9	19.7	19.3	24.6	
1870	19.0	20.6	24.7	23.0
1	25.1	19.5	25.0	22.6

Meteorology of the Year.

The mean temperature of the air, as deduced from Mr. Hartnup's observations at the neighbouring observatory on Bidston Hill, was 49.1, or 4 tenth's of a degree Fahrenheit less than the average of the previous twenty years. January was uniformly colder than the average. March and April, warmer. The latter half of September and the middle half of the 4th quarter were also much below the average, constituting trying periods for the public health. The barometrical mean was 29,243 inches, being 0.030 above the average of the preceding 20 years. The amount of rainfall reached 27.3 inches, which was in excess of the average quantity, and the class of westerly winds—including due south—prevailed over the class of easterly winds—including due north—in the proportion of 53 to 47 per cent.

* Registrar General's 4th Quarterly Report of 1871.

Meteorological Results of the 4 quarters.

Agents.	Winter, or 1st Quarter.	Spring, or 2nd Quarter	Summer, or 3rd Quarter	Autumn, or 4th Quarter.
Westerly class of winds per cent. (including due south)	51.4	53.7	58.9	47.4
Rainfall, in inches	3.73	5.97	8.74	8.88
Rainfall, in hours.....	104.8	118.6	152.6	165.7
Mean pressure of Air	29.917	29.954	29.908	29.992
Mean degrees of Temperature...	40.8	52.6	59.3	43.7
Corresponding means of previous 20 years, averaged	40.6	52.8	59.4	45.1

For further details see Table III.

Mortality as to Groups and Diseases.

By an arrangement of the year's death causes in groups and diseases, alongside a similar one of the averages, corrected for variations of population, of the preceding seven years, the differences can be readily seized upon and computed. Such an arrangement is inserted in page 6, and it shows at once the increase of deaths in the 1st or Zymotic group over the average to be 57; in the 2nd or Constitutional group to be 22; and the increase in the third or great Local group to be 88. The 4th or Developmental group is not seen to differ, while the 5th or group of Violent Deaths may be at present left out of view as not being influenced by ordinary causes of fatal disease. Turning these numbers into per centages, we find the 3rd or local diseases group—the mortality of which is influenced by both weather and insanitary conditions—to yield the largest increase, or a rate of 27 per cent. above the average. The next in degree of increase is the 1st or Zymotic group, affected chiefly by insanitary conditions, giving an excess of 19 per cent.; and, last, the second or Constitutional group—influenced, though less quickly, by both weather and insanitary conditions—the deaths of which exceed the average by 14 per cent.

The Death Causes of 1871 contrasted with corrected averages of the previous 7 years.

Groups and Diseases.		1871.	Averages, 7 Years.	Differences.
1st, Zymotic Group.	Small Pox	9	21	—12
	Measles	105	33	+72
	Scarlatina	68	67	+ 1
	Diphtheria	5	7	— 2
	Whooping Cough	55	27	+28
	Fevers	17	39	—22
	Diarrhœa	59	55	+ 4
	Other Zymotics	30	42	—12
	Total Zymotic Diseases ...	348	291	+57
2nd, Constitutional Group.	Gout	35	28	+ 7
	Scrofula, Phthisis, &c.	144	129	+15
	Total Constitutional Diseases	179	157	+22
3rd, Local Diseases Group.	Brain, &c.	131	97	+34
	Heart, &c.	41	30	+11
	Lungs, &c.	168	145	+23
	Stomach, &c.	48	33	+15
	Kidneys, &c.	17	11	+ 6
	Uterus, &c.	3	2	+ 1
	Bones, &c.	3	3	
	Skin, &c.	3	5	— 2
	Total Local Diseases	414	326	+88
4th, Developmental Diseases Group.	Premature Birth, Teething &c	32	33	— 1
	Childbirth	7	5	+ 2
	Old Age	30	29	+ 1
	Atrophy and Debility	64	69	— 5
	Total Developmental Diseases	133	136	— 3
5th Group	Violent Deaths	58	42	+16
	Causes not specified	5	15	—10
	Totals, &c.	1137	967	+170

Zymotic Mortality.

Continuing the examination of the above comparison from the groups into the chief Zymotic diseases, it will be seen that Small-pox, to be afterwards specially referred to, Fevers—which, with one exception, have steadily declined in mortality since 1864—and Diphtheria are below the average, Scarlet Fever and Diarrhœa slightly above; but the two fatal diseases of the year, Measles and Whooping Cough, shew the large amounts of 105 and 55 deaths respectively, giving 72 and 28 above the averages. The excesses of these two diseases, especially that of the former, constitute prominent features of the Zymotic class of the year. It is, indeed, a usual experience in this group for one of them to be taking its turn in inflicting a leading and absorbing mortality on town populations. This is due to the introduction of new virus, or to some intensifying of the local poison, while the number of children born since the previous invasion supplies a new and virgin field for renewed ravages; but in the Death Register of 1871 there is this peculiarity, that the leading disease—Measles—far surpassed itself in any previous mortality of the seven years, although its fatality returned after an unusually short period, as the following extract, corrected for population, demonstrates:—

	1864	'5	'6	'7	'8	'9	1870	'1
Measles	65·3	17·9	30·0	19·7	22·6	69·3	1·0	105.
Whooping Cough ...	9·2	23·9	41·0	24·8	56·4	8·7	21·0	55.

High Mortality of Measles.

The former years of highest mortality for Measles are seen to be 1864 and 1869, but both years are surpassed by that of 1871 by no less than 50 per cent. It is easy to say this is owing to new or intensified virus, but as the virus power itself is capable of immense amelioration by good sanitary measures their efficiency is challenged and arraigned by so large an increase of deaths. The quick recurrence of a high Whooping Cough mortality tends also to a similar conclusion.

Seasonal Influence.

The mortality of the year, as affected by seasonal influence, comes next for review, and the following table is constructed to shew, 1st, the total mortality of each of the four quarters; 2nd and 3rd, that of

The Death Causes of 1871 contrasted with corrected averages of the previous 7 years.

Groups and Diseases.		1871.	Averages, 7 Years.	Differences.
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	Diarrhœa	59	55	+ 4
	Other Zymotics	30	42	—12
	Total Zymotic Diseases	348	291	+57
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	Heart, &c.	41	30	+11
	Lungs, &c.	168	145	+23
	Stomach, &c.	48	33	+15
	Kidneys, &c.	17	11	+ 6
	Uterus, &c.	3	2	+ 1
	Bones, &c.	3	3	
	Skin, &c.	3	5	— 2
	Total Local Diseases	414	326	+88
4th, Developmental Diseases Group.	Premature Birth, Teething &c	32	33	— 1
	Childbirth	7	5	+ 2
	Old Age	30	29	+ 1
	Atrophy and Debility	64	69	— 5
	Total Developmental Diseases	133	136	— 3
5th Group	Violent Deaths	58	42	+16
	Causes not specified	5	15	—10
	Totals, &c.	1137	967	+170

Zymotic Mortality.

Continuing the examination of the above comparison from the groups into the chief Zymotic diseases, it will be seen that Small-pox, to be afterwards specially referred to, Fevers—which, with one exception, have steadily declined in mortality since 1864—and Diphtheria are below the average, Scarlet Fever and Diarrhœa slightly above; but the two fatal diseases of the year, Measles and Whooping Cough, shew the large amounts of 105 and 55 deaths respectively, giving 72 and 28 above the averages. The excesses of these two diseases, especially that of the former, constitute prominent features of the Zymotic class of the year. It is, indeed, a usual experience in this group for one of them to be taking its turn in inflicting a leading and absorbing mortality on town populations. This is due to the introduction of new virus, or to some intensifying of the local poison, while the number of children born since the previous invasion supplies a new and virgin field for renewed ravages; but in the Death Register of 1871 there is this peculiarity, that the leading disease—Measles—far surpassed itself in any previous mortality of the seven years, although its fatality returned after an unusually short period, as the following extract, corrected for population, demonstrates:—

	1864	'5	'6	'7	'8	'9	1870	'1
Measles	65·3	17·9	30·0	19·7	22·6	69·3	1·0	105.
Whooping Cough	9·2	23·9	41·0	24·8	56·4	8·7	21·0	55.

High Mortality of Measles.

The former years of highest mortality for Measles are seen to be 1864 and 1869, but both years are surpassed by that of 1871 by no less than 50 per cent. It is easy to say this is owing to new or intensified virus, but as the virus power itself is capable of immense amelioration by good sanitary measures their efficiency is challenged and arraigned by so large an increase of deaths. The quick recurrence of a high Whooping Cough mortality tends also to a similar conclusion.

Seasonal Influence.

The mortality of the year, as affected by seasonal influence, comes next for review, and the following table is constructed to shew, 1st, the total mortality of each of the four quarters; 2nd and 3rd, that of

the non-Zymotic and the Zymotic diseases, respectively; and, 4th, that from Measles alone as the leading epidemic of the year. To all of these the corresponding averages of the previous seven years are added, corrected for difference of population :—

Comparison Table of Deaths from All Causes, Non-Zymotic and Zymotic Diseases, and Measles, for each of the four quarters of the year.

	1st, or Winter Quarter.	2nd, or Spring Quarter.	3rd, or Summer Quarter.	4th, or Autumn Quarter.
Part I.				
Total Deaths, 1871.....	286	213	239	399
7 years' average do.	256	208	234	267
Excesses	30	5	5	132
Part II.				
Non-Zymotic Deaths, 1871	232	178	161	218
Do. 7 years' average	185	151	150	188
Excesses	47	27	11	30
Part III.				
Zymotic Deaths, 1871.....	54	35	78	181
Do. 7 years' average...	72	56	82	79
Differences.....	—18	—21	—4	+101
Part IV.				
Deaths from Measles, 1871	0	2	16	87
Do. 7 years' average ...	6	4	8	15
Differences	—6	—2	+8	+72

Other than Climatic Causes Increasing the Death Rate.

In reading over the excesses of total deaths in the four quarters of 1871, in part 1st it is found that three-fourths of the whole belong to the fourth quarter and three-fourths of the remainder to the first. Now this coincides so closely with the proportionate deficiency of temperature recorded in the first quarter, and also with the much more prolonged deficiency recorded in the fourth, as to immediately suggest the idea of

cause and effect; but if we exclude Zymotic diseases, which are only indirectly affected by low temperature, as is done in part 2nd, the conformity disappears, and though the operation of unusual cold is too well ascertained to admit of any doubt of its having contributed to the increased mortality of non-Zymotic diseases in the first and fourth quarters, it cannot be admitted to have also caused the increased mortality of the second and third, which had no unusual cold recorded; other causes, therefore, than direct climatic ones must have increased the non-Zymotic mortality. In part 3rd it is seen that the Zymotic deaths of the first three quarters are decidedly below the average, but this gain is very much overbalanced by the large excess in the fourth, which amounts to 102 on the quarter, and affords 59 of excess on the average for the year. This excess in the quarter is due chiefly to deaths from Measles, which numbered 72, as seen in part 4. This epidemic of Measles was doubtless rendered more fatal by the unusual autumnal cold which often prevented recovery from the lung affections common in the disease; but that the type of the disease was itself a bad one is proved by the high mortality of the succeeding quarter, since run out, though its temperature was remarkable for unusual warmth.

The Age Periods of Death. *

The ages at which deaths occur, taken in conjunction with the enumerated ages of the community, form an important element in vital statistics; but they cannot be applied to those of 1871 until the Census Commissioners have completed and published their labours. The difference of the ages at which the deaths took place, as compared with the averages, corrected for varying population of the previous five years, may, however, be recorded as follows :—

* While correcting the last proofs for press, the Medical Officer received, through the kindness of his friend, Mr. W. Clode, of the Registrar General's Department, the Age Census of Birkenhead and Claughton. It is briefly as follows, viz. :—Under 1 year, 1554; 1 year and under 2, 1254; 2 years and under 5, 3905; 5 years and under 10, 5509; 10 years and under 15, 4718; 15 years and under 20, 4293; 20 years and under 30, 8259; 30 years and under 40, 6474; 40 years and under 50, 4647; 50 years and under 60, 2931; 60 years and under 70, 1310; 70 years and under 80, 496; 80 years and under 90, 62; 90 years and under 100, 6.

Table contrasting the Age Periods of the year's Mortality with the average Age Periods of the previous 5 years.

Age Periods.	Previous 5 years' average.	1871.	Increase per cent.
Below 1 year of age	256	312	22
„ 2 years „ „	111	158	42
„ 5 „ „ „	119	149	25
„ 10 „ „ „	59	67	12
„ 15 „ „ „	22	13	...
„ 20 „ „ „	20	28	40
„ 30 „ „ „	58	59	1·7
„ 40 „ „ „	61	76	25
„ 50 „ „ „	74	73	...
„ 60 „ „ „	64	90	40
„ 70 „ „ „	48	59	23
„ 80 „ „ „	34	31	...
„ 90 &c„ „ „	11	22	100
Totals, &c.	937	1137	21

Range of the Mortality Over the Age Periods.

A glance at the above table shows the increased mortality of the year to have ranged through nearly every period of life, the exceptions of nine under the head "Below 15," of one under "Below 50," and of three under "Below 80," being too small in difference and number to be important. Of the others, those between 1 and under 2 years of age, between 15 and under 20, and between 50 and under 60 suffered an excess death rate about double the average of the whole. Two-thirds of the excess under two years of age were owing to Zymotic, and the remaining third chiefly to Tuberculous and Brain disease; the excess under 20 was due to Tuberculous and Heart disease; and a moiety of those under 60 was attributable to Lung disease. The extreme excess of 100 per cent. under the head of "below 90, &c.," is founded on numbers too small (11 and 22) to claim much significance. The greater part of these consisted of deaths from old age.

A Practical Aim.

Having now briefly pointed out the salient points of the registered

mortality of the year, a more difficult, but not less incumbent, duty remains to be done, viz., a tentative elimination of such preventable causes of the increased mortality as may enable the Health Committee to adopt the best means for their abatement or removal.

Previous Inferences Recalled.

In treating this subject it may be assumed from what has been already said that the amount of increased mortality—amounting to 67 deaths or 6 per cent. above the seven years average, and 232 or 33 per cent. above the deaths of the previous year—is very considerable; 2nd, that the increase is diffused pretty generally over all diseases, and takes in, generally, all ages; 3rd, that the non-Zymotic diseases shew an excess of deaths in all the quarters, while the Zymotic show an excess, but an unprecedentedly large one, only in the last or autumn quarter; 4th, that the leading Zymotic—Measles—was more fatal than on any recent occasion; and, 5th, that no indication of any such continued or generally diffused increase appears in the Registrar General's published returns of 1871 in all England, in the rural or the urban populations, or in the county or in the neighbouring seaport town.

Extra Factors in the Death Rate recognized.

With such premises we are forced to conclude that, in addition to the action of climatic and irregular causes, there is evidence of other ones elevating the death rate persistently throughout the varying seasons of the year, bringing under their influence nearly all the age periods of death, and rendering more mortal nearly every kind of disease. Zymotic deaths are, it is true, found in excess, though in a very large one only in the fourth quarter, but this exception loses weight from the consideration that autumnal heat could quickly make up, with excess, every arrear when the Zymotic infection obtained the requisite time for diffusing itself.

The Probable Causation.

This large increase of deaths, extending to nearly all diseases, over almost every age, and throughout each season, as well as the apparently exceptional concentration of Zymotic deaths, are quite conformable as results to what might arise from a continued deficiency in the ordinary large sanitary operations of the town, and it may be conceded that, owing to various unfavorable circumstances—the night soil

removal contract, the scavenging of the streets, and the complete removal of road scrapings and refuse have all been much less extensively and efficiently carried on during the year and previous 6 months. The reduction, &c., of the inspectorial staff has also not only materially interfered with the prompt discovery and abatement of nuisances, but has allowed to deteriorate the improved sanitary habits formerly instilled in the mass, and afterwards kept up by the constant, though friendly, pressure exercised on them by efficient inspection. A good officer is a veritable missionary of health. The important by-law that all housekeepers should keep their portions of footpath clean, too, seems to have fallen altogether into disuse, thus retaining and hoarding the lightest organic, and, generally, the most putrid dust for constant inception into houses, and into the lungs of foot passengers. An enforcement of the by-law, or a public provision for ensuring this important sanitary requirement, is much needed, but, as all these subjects are under the consideration of the Committee, they need not be further considered here.

Check and Extinction of the Small Pox Epidemic.

Among the sanitary events of this and the previous year none can be dwelt upon with such great satisfaction as the prompt check and final arrest, in Birkenhead, of the Small Pox epidemic, which, for more than two years, has been pursuing its fatal course in various parts of the country. The fact, too, of this arrest, in view of the unfavorable circumstances already acknowledged, and of the serious results of former invasions, constitutes no mean crucial test that vaccination of itself alone can reduce this disease from the most dreaded and fatal to one of the least hurtful and serious of the Zymotic class. As described in the last yearly report, Small Pox appeared first in Egerton-street, during May 1870*, and, omitting no other practicable measure, the great principles of vaccination and re-vaccination were at once adopted and acted upon as the real base of defence. In carrying out this plan the facts of the epidemic were immediately communicated to every local medical practitioner, a strict canvass was at once instituted in all streets contiguous to the infected locality, and the numerous unvaccinated children, &c., were promptly operated on by the public vaccinator.

* Note—Full particulars of the early invasion, with remarks and suggestions by the Medical Officer, were published in the Lancet of December 3rd, 1870.

The parish surgeons were also indefatigable in their exertions to apply the prophylactic to every one within their reach or control, and revaccination was effected, to a large extent, by private practitioners. All these measures, vigorously kept up, in spite of fresh introductions of the disease, limited the deaths to 5 * during the remainder of the year of invasion, and to 18 * during 1871, until the end of October, at which time the epidemic may be considered to have been fully arrested, no further case having occurred in the ensuing six months since expired.

Method and Favoring Circumstances.

Such a decisive result could only be arrived at by employing the true method, and being aided by a conjunction of accidentally favoring circumstances, unnecessary to specify here, but which enabled vaccination and re-vaccination to be thoroughly and effectively carried out.

Reality of the Danger and of the Extrication.

So much success renders it desirable to note some further facts in illustration of the reality of the dangers thus escaped. Birkenhead (and Claughton), though at present having a reduced population within its own limits of 45,000, forms the nucleus of a much larger though contiguous one. Its records shew two former epidemics of Small Pox, one of which in 1857-58, resulted in 73 deaths in a population of 33,000, giving a ratio of 22 per 10,000; another in 1863, 1864, and 1865 resulted in 195 deaths with a population of 53,000, giving a ratio of 36 per 10,000; the recent epidemic of 1870-71 coming after a longer interval, resulted in only 23 * deaths in a population of 45,000, giving a ratio of only 5 * per 10,000.

County Comparisons.

It may also be stated that Birkenhead, along with Runcorn and Nantwich, were the first places fatally affected in Cheshire, the first deaths being registered in each during the second quarter of 1870. The following table gives the progress of fatal Small Pox in Birkenhead, in the county town, and in the whole of Cheshire to the end of 1871, in quarters of years.

* Note.—These numbers include the fatal Small Pox cases removed from the streets named at page 21 to the Workhouse Hospital situate beyond the limits of the town. Particulars of these cases have been kindly furnished by Mr. Redding, the Master of the Workhouse.

	1870.				1871.				
PLACES.	1st Qr.	2nd Qr.	3rd Qr.	4th Qr.	1st Qr.	2nd Qr.	3rd Qr.	4th Qr.	Total.
Birkenhead *		1		4	7	4	6	1	23
Chester				1	2	2	25	22	52
All Cheshire.....		3	4	13	41	45	60	45	211

The population of Birkenhead (and Claughton) town, at the census of 1871, was 45,035, of Chester City (Cathedral and Castle Registration Sub-districts) was 45,953, and of Cheshire 561,131, the latter being in amount rather more than 12 times the population of Birkenhead, as it is also of the similar total of the population of Chester.

EXTENSIVE PREVALENCE OF THE DISEASE (MODIFIED BY GENERAL VACCINATION.)

Besides being in intimate communication with the infected district of the opposite bank of the river, where the mortality from the disease amounted to 38 per 10,000, Birkenhead itself was thoroughly over-run with the disease, but the protective power of the unusually complete vaccination nearly altogether deprived it of its lethal effects. As there is no present registration of diseases, the Medical Officer has no effective means of arriving at the total number of Small Pox cases thus modified, but he has recorded nearly a hundred which have come within his knowledge, and arranging these as to locality in the 18 ashpit-cleansing districts, which are divided so as to give approximately equal numbers of houses, and supplementing these by 3 more to take in the remaining more scattered parts of the town, he finds that only two out of the twenty-one districts escaped the actual presence of the disease, and consequent exposure to its infection. With the limited success already obtained when he wrote his last report (for 1870), the Medical Officer ventured to express himself thus:—"In the present instance the extent to which Vaccination has been carried out, together with some favoring circumstances, more than promises, it may, be asserted, will ensure, that the present epidemic will be far less fatal than on former occasions." The final result has more than verified this sanguine prediction. Numbers of lives have been saved, a very large amount of serious sickness has been avoided, and much

* See note of preceding page.

time and money have been saved to the community. It is to be hoped that, before another cycle brings round the inevitable re-invasion, reliable legal powers will replace the accidental circumstances which enabled the last epidemic to be so successfully arrested.

BIRTHS AND BIRTH RATE.

The total number of births registered during the year was 1715, or 77 less than those of the previous one. Of the total number 895 were males, and 820 were females, giving a rate per annum of 37·9 per 1,000.

DRAIN AND SEWER VENTILATION.

A recent event has powerfully drawn the public attention to the necessity which exists for having proper outlets for the foul gases generated in drains, these bught in every case to be properly ventilated from their upper terminations, and be conjoined with a free and complete public sewer ventilation, otherwise there will be a danger of drain ventilators tapping off continuous gases from the sewers into dangerous proximity with houses and windows. In cottages, where faulty drains do not often receive early attention, drains should not be brought within the dwelling at all, but all effluent water should be conveyed into them by pipes, which should terminate over gully holes, but not be continued into them.

SOME SANITARY WORK.

The system, established some years ago, of disinfecting cab stands, and gully cleansings during the warm weather, has been continued, and, also, the disinfecting of cleansed ashpits continuously during the year. In close localities where Small Pox shewed itself this was extended to streets and back passages. 186 notices to whitewash and cleanse dirty houses were given and complied with. 165 dead dogs and cats were removed from ponds, and the latter were caused to be drained in the majority of instances. 263 cases of defective flagging, &c., were referred to the Surveyor, 232 nuisance removal notices were issued and enforced. Two cases of excessive smoke were brought under notice of Mr. Preston, and fines inflicted; and, lastly, the night soil removals amounted to 6909, but, from various causes, they were far from being satisfactorily performed.

Tables, &c.

The various details connected with the mortality and meteorology of the year are fully set forth in the annexed tables, of which No. I gives the causes of death, arranged as to numbers, under the different periods of age, together with the relative numbers of the sexes. No. II. gives the number of death causes for each week of the year. No. III. gives the same as to plan, but aggregates the causes of death into classes, and also gives the meteorological phenomena for the weeks, the quarters, and the year. No. IV. gives the analysis of the deaths from Fevers and Violence, and notes some death causes not specifically distinguishable in the larger tables. No. V. gives the (lunar) monthly deaths from all causes, and from Zymotic causes, with the rate per 1,000 per annum for each. No. VI. gives the streets in which deaths from any cause occurred, and also those from Zymotic disease in a separate column. And No. VII. specifies the occupations, &c., of all who, either themselves, or members of whose family have died throughout the year.

Mr. Hartnup.

Thanks have been again voted by the Committee to Mr. Hartnup for furnishing the Medical Department with the daily results of his valuable meteorological labors throughout the year.

C. O. BAYLIS, M.D., M.R.C.S., &c.

Birkenhead Commissioners'
Health Department,
May, 1872.

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TABLE II.—Ætal Register of Deaths in Birkenhead (and Claughton,)

For the Year ending December 31st, 1871.

CAUSES OF DEATH.	AGE BELOW.													SEX.		TOTALS.
	1	2	5	10	15	20	30	40	50	60	70	80	90	100	M.	FE.	
FROM ALL CAUSES.	312	158	149	67	13	28	59	76	73	90	59	31	22		587	550	1137
I.—Zymotic Diseases	90	83	99	39	6	3	5	9	5	4	2	.....	.....	....	184	164	348
II.—Diseases of uncertain or variable Seat..	1	.....	.....	.....	2	1	3	5	7	8	6	1	1	....	11	24	35
III.—Tubercular Diseases	20	18	8	7	1	14	25	21	19	9	1	1	.....	....	70	74	144
IV.—Diseases of the Brain, Nerves, &c.....	62	16	12	3	1	2	2	5	5	9	4	6	4	....	70	61	131
V.—Diseases of the Heart and Blood Vessels	1	.....	.....	1	3	4	4	7	5	7	7	2	.....	....	21	20	41
VI.—Diseases of the Lungs, &c	44	21	18	10	.....	1	1	7	10	27	17	9	3	..	82	86	168
VII.—Diseases of the Stomach, Liver, &c....	7	1	3	1	.....	.....	6	5	5	13	6	1	.....	....	22	26	48
VIII.—Diseases of the Kidneys, &c	.....	.....	2	1	.....	.....	1	1	3	4	5	.....	.....	....	11	6	17
IX.—Diseases of the Uterus, &c.	.....	.....	.....	.....	.....	.....	.....	2	1	...	.....	.....	.....	....	.....	3	3
X.—Diseases of the Bones, &c	.....	.....	.....	1	.....	.....	.....	1	.....	.....	.....	1	.....	....	2	1	3
XI.—Diseases of the Skin, Cellular Tissue, &c.	1	.....	.....	1	.....	.....	.....	.....	.....	.....	1	.....	.....	....	1	2	3
XII.—Premature Birth, Teething, &c	25	6	1	.....	...	...	.....	.....	.....	.....	.....	.....	.....	....	18	14	32
XIII.—Childbirth and Paramenia	.....	.....	.....	.....	.....	.....	2	5	.....	.....	.....	.....	.....	....	.....	7	7
XIV.—Old Age	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	9	8	11	1	13	17	30
XV.—Atrophy and Debility	54	6	2	.....	.....	.....	.....	.....	1	1	.....	.....	.....	....	33	31	64
XVI.—Violence	4	4	4	3	.....	3	10	8	11	6	1	2	2	....	45	13	58
Causes not Specified	3	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	....	4	1	5
I.—Small Pox	1	.....	1	1	.....	1	1	3	1	.....	.....	.....	.....	....	5	4	9
Measles	17	39	42	6	.....	.....	.....	.....	1	.....	.....	.....	.....	....	59	46	105
Scarlatina	4	10	32	18	3	.....	1	.....	.....	.....	.....	.....	.....	....	34	34	68
Diphtheria	.....	.....	3	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	2	3	5
Whooping Cough	23	21	9	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	25	30	55
Fever—Typhus—Enteric, &c	.....	.....	3	4	2	2	2	2	1	.....	1	.....	.....	....	8	9	17
Diarrhœa	34	15	4	3	.....	.....	.....	.....	1	2	.....	.....	.....	....	31	28	59
Cholera	.....	.....	.....	...	1	.....	.....	.....	.....	1	.....	.....	.....	....	.....	2	2
Dysentery	.....	.....	.....	...	.....	.....	.....	.....	.....	1	.....	.....	.....	....	.....	1	1
Croup	1	1	5	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	8	1	9
Cynanche—Aphthæ	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	2	.....	2
Erysipelas	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	1	1
Syphilis	7	.....	.....	.....	.....	.....	.....	1	1	.....	1	.....	.....	....	6	4	10
Purpura	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	1	1
Intemperance	.....	.....	.....	.....	.....	.....	1	3	.....	.....	.....	.....	.....	....	4	.....	4
II.—Dropsy	1	.....	.....	.....	2	.....	1	2	2	3	3	.....	1	....	9	6	15
Cancer	.....	.....	.....	.....	.....	.....	2	1	5	5	3	1	...	....	2	15	17
Rheumatism	.....	.....	.....	.....	.....	1	.....	2	.....	.....	.....	.....	.....	....	.....	3	3
III.—Scrofula	7	6	.....	2	.....	1	.....	.....	.....	1	.....	.....	.....	....	6	11	17
Hydrocephalus	11	8	5	.....	...	.....	.....	.....	.....	.....	.....	.....	.....	....	12	12	24
Phthisis	.....	3	3	4	.....	13	25	20	19	8	1	1	.....	...	49	48	97
Tabes Mesenterica	2	1	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	....	2	3	5
Diabetes	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	....	1	.....	1
IV.—Inflammation of Brain, &c	7	1	4	1	1	2	.....	3	.....	.....	.....	.....	.....	....	12	7	19
Apoplexy—Paralysis	.....	.....	.....	.....	.....	.....	2	1	4	6	3	6	3	....	10	15	25
Epilepsy	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	....	.....	2	2
Convulsions	52	12	5	.....	...	.....	.....	.....	.....	.....	.....	.....	.....	....	40	29	69
Disease of Brain, &c	2	3	3	2	.....	.....	.....	1	.....	2	1	.....	1	....	7	8	15
Ottitis	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	1	.....	1
V.—Disease of Heart	1	.....	.....	1	3	3	4	6	5	6	7	2	.....	....	19	19	38
Disease of Blood Vessels	.....	.....	.....	.....	.....	1	.....	1	.....	1	.....	.....	.....	....	2	1	3
VI.—Tracheitis, Laryngites, and Laryngismus	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	2	1	3
Bronchitis	25	8	8	3	.....	1	.....	3	6	24	12	8	3	....	45	56	101
Pneumonia	16	13	9	7	.....	.....	.....	4	3	1	3	1	.....	....	29	28	57
Asthma	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	1	.....	.....	....	2	1	3
Disease of Lungs, &c	1	.....	.....	.....	.....	.....	1	.....	1	.....	1	.....	.....	....	4	.....	4
VII.—Throat Ulceration	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	2	2
Inflammation of Stomach and Bowels..	4	.....	2	.....	.....	.....	1	.....	1	.....	1	1	.....	....	4	6	10
Disease of Stomach and Bowels	2	.....	...	1	.....	.....	.....	.....	1	1	1	.....	.....	....	4	2	6
Peritonitis	.....	.....	.....	.....	.....	.....	3	1	.....	4	1	.....	.....	....	3	6	9
Disease of Liver	.....	.....	.....	.....	.....	.....	.....	2	3	7	2	.....	.....	....	7	7	14
Hernia	1	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	....	2	1	3
Obstructed Bowel	.....	.....	.....	.....	.....	.....	1	1	.....	1	1	.....	.....	....	2	2	4
VIII.—Disease of Kidneys	.....	.....	1	.....	.....	.....	.....	.....	1	.....	2	.....	.....	....	2	2	4
Disease of Bladder and Prostrate	.....	.....	.....	.....	.....	.....	.....	1	.....	1	1	.....	.....	....	2	1	3
Nephria and Albumenuria	.....	.....	1	1	.....	.....	1	.....	1	3	2	.....	.....	....	6	3	9
Incontinence of Urine	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	....	1	.....	1
IX.—Disease of Uterus and Ovaries	.....	...	.....	.....	.....	.....	.....	2	1	.....	.....	.....	.....	....	.....	3	3
X.—Disease of Bones and Joints	.....	.....	.....	1	.....	.....	.....	1	.....	.....	.....	1	.....	....	2	1	3
XI.—Disease of Cellular Tissue	1	.....	.....	1	.....	.....	.....	.....	.....	.....	1	.....	.....	....	1	2	3
XII.—Premature Birth	18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	9	9	18
Teething	7	6	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	9	5	14
XIII.—Childbirth	.....	.....	.....	.....	.....	.....	2	5	.....	.....	.....	.....	.....	....	.....	7	7
XIV.—Old Age	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	9	8	11	1	13	17	30
XV.—Atrophy and Debility	54	6	2	.....	.....	.....	.....	.....	1	1	.....	.....	.....	....	33	21	64
XVI.—Burns—Scalds	1	4	4	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	4	6	10
Drowning—Asphyxia	.....	.....	.....	1	.....	.....	1	4	1	.....	.....	.....	.....	....	7	.....	7
Wounds, Blows, Crushes, Falls, &c...	.....	.....	.....	1	.....	2	5	3	6	5	1	2	2	....	25	2	27
*Suicide	.....	.....	.....	.....	.....	1	3	1	1	1	.....	.....	.....	....	5	2	7
*Homicide	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	1	2	3
*Murder	.....	.....	.....	.....	.....	.....	1	.....	3	.....	.....	.....	.....	....	3	1	4
Causes not specified	3	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	....	4	1	5
MALES	166	87	78	38	8	11	34	41	33	42	29	10	10		587	.....	1137
FEMALES	146	71	71	29	5	17	25	35	40	48	30	21	11	1	.....	550	

TABLE II.—Weekly Register of Deaths in Birkenhead (and Claughton), 1871.

CAUSES OF DEATH.	WEEKS. 1	2	3	4	5	6	7	8	9	10	11	12	13	1st Qr.	WEEKS. 14	15	16	17	18	19	20	21	22	23	24	25	26	2nd Qr.	WEEKS. 27	28	29	30	31	32	33	34	35	36	37	38	39	3rd Qr.	WEEKS. 40	41	42	43	44	45	46	47	48	49	50	51	52	4th Qr.	Year.
Class I.—Small Pox	..	..	..	..	..	1	..	..	..	..	1	..	1	3	..	1	..	..	..	..	..	..	..	..	..	1	..	2	1	..	..	..	..	..	1	1	..	..	..	..	3	..	..	1	..	..	..	..	..	..	..	..	..	1	9
Measles	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	2	..	..	..	..	..	..	2	..	1	..	3	4	6	16	8	1	11	6	8	6	9	14	7	4	4	2	7	87	105
Scarlatina	2	2	1	..	..	..	..	2	1	1	..	2	1	12	1	..	1	..	..	..	..	..	1	..	..	..	..	3	..	1	..	..	1	..	1	2	..	..	2	..	..	3	10	5	1	6	2	2	3	4	5	5	2	3	4	1	43	68
Diphtheria	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	2	5
Whooping Cough	1	3	2	1	4	2	1	1	1	..	1	3	2	22	2	..	..	2	..	1	1	2	..	..	1	..	..	9	..	..	..	1	..	1	..	1	1	..	1	..	..	5	1	..	3	2	1	1	1	1	2	1	1	4	19	55
Typhus, Enteric, and other Fevers	..	..	2	..	..	..	2	..	..	..	..	..	..	4	..	..	..	..	..	1	..	1	..	..	..	1	..	3	1	..	1	..	1	..	1	..	..	..	1	..	..	5	..	2	1	..	1	..	..	..	..	..	1	..	..	5	17
Diarrhœa	..	1	..	..	..	..	..	..	..	1	..	..	..	2	..	1	..	..	..	1	..	..	..	1	1	1	3	2	10	..	1	..	1	1	..	3	2	3	3	7	9	3	33	3	6	1	..	2	1	..	..	..	..	1	..	14	59
Cholera	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	1	2
Dysentery	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Croup	..	..	..	1	1	1	..	1	..	1	..	..	..	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	2	..	..	..	..	..	..	..	1	..	..	1	..	2	9
Cynanche—Aphthæ	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	2
Erysipelas	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1
Syphilis	1	..	..	..	..	..	1	1	..	..	..	..	..	3	..	..	..	..	..	1	..	..	..	1	1	..	..	3	1	..	..	..	..	..	..	..	..	1	..	..	..	2	..	..	..	..	..	..	..	1	1	..	..	2	10
Puerpera	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	1
Intemperance	..	..	..	..	..	1	..	..	..	..	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	2	4
,, II.—Dropsy	..	..	..	1	..	2	..	..	1	..	..	..	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1	..	..	1	1	..	..	5	..	..	..	..	..	..	1	..	1	1	1	1	6	15
Cancer	..	1	..	1	..	2	..	..	..	2	..	1	..	7	1	..	..	..	..	..	..	2	..	..	1	1	1	6	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	1	..	1	3	17
Rheumatism	..	..	..	..	..	..	1	..	..	1	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	3
,, III.—Scrofula	1	1	..	1	..	1	1	..	..	1	..	1	..	7	..	1	..	..	..	1	..	..	2	..	1	..	..	3	..	..	..	1	..	..	..	2	1	..	..	1	..	5	..	..	..	..	1	1	..	..	..	..	..	2	17
Hydrocephalus	..	2	1	..	..	..	..	1	..	2	..	..	..	6	..	..	1	1	1	..	..	2	..	1	1	..	..	7	..	..	..	..	1	3	..	..	..	..	..	..	1	5	2	1	..	1	..	1	..	1	..	..	..	6	24
Phthisis	2	3	2	3	..	3	3	1	1	2	..	6	3	29	1	1	..	..	4	1	3	6	..	..	2	1	2	21	1	1	..	2	3	1	1	..	1	4	..	2	4	20	2	1	4	..	1	2	3	3	1	1	3	3	3	27	97
Tabes Mesenterica	1	..	..	..	..	..	..	1	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	2	..	..	2	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	5
Diabetes	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	1
,, IV.—Inflammation of Brain	..	..	..	..	..	1	..	1	..	1	..	1	..	4	1	..	1	..	..	..	..	..	1	1	1	1	..	7	..	..	..	2	..	..	..	..	..	..	1	..	..	3	..	1	..	1	..	..	..	..	..	..	1	5	19
Apoplexy and Paralysis	..	..	..	3	..	..	1	..	1	..	1	..	..	6	..	1	..	2	1	..	2	1	..	1	1	..	..	8	..	..	1	..	2	..	2	..	1	..	..	1	..	7	..	1	..	1	..	..	1	..	..	..	..	4	25
Epilepsy	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	2
Convulsions	3	1	1	1	1	..	3	2	..	..	..	..	1	13	2	4	2	2	1	3	1	1	2	3	1	2	1	25	..	1	2	2	1	1	2	2	1	2	1	..	17	1	1	1	1	1	2	1	1	1	2	..	1	1	14	69
Disease of Brain, &c	1	..	1	..	1	..	..	3	..	1	1	..	1	9	..	..	..	..	..	..	..	..	..	1	1	..	..	2	1	1	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	2	15
Ottitis Acute	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1
,, V.—Disease of Heart	1	1	3	2	..	..	..	1	1	1	2	2	..	14	1	2	..	1	..	1	..	2	..	1	..	..	2	10	1	..	1	1	..	..	..	..	..	2	..	1	6	..	1	..	1	1	..	..	..	1	1	..	2	8	38
Disease of Blood Vessels	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	3
,, VI.—Tracheitis, Laryngites, Laryngismus	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	3
Bronchitis	4	2	5	9	2	1	3	3	2	..	..	2	1	36	1	..	2	3	1	2	3	2	..	..	2	2	1	19	..	..	1	3	..	..	..	..	..	1	..	..	2	3	10	3	2	3	5	3	2	2	3	2	2	4	2	3	36	101
Pneumonia	..	1	4	2	..	2	3	..	1	2	..	3	1	19	..	..	1	1	..	1	2	..	4	..	1	1	1	12	..	..	..	..	1	..	..	1	1	..	1	1	..	5	3	1	1	5	3	..	2	2	1	..	..	2	1	21	57
Asthma	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	1	3	3
Disease of Lungs, &c	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	1	..	..	..	..	3	..	..	1	..	..	..	..	..	..	..	..	..	1	4
,, VII.—Ulceration of Throat	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	1	2
Inflammation of Stomach and Bowels	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	2	1	..	..	..	..	5	..	..	..	3	..	1	..	..	..	..	1	..	5	10
Disease of Stomach and Bowels	..	1	..	..	..	2	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	1	..	2	6
Peritonitis	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	1	..	..	..	2	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	1	..	1	1	..	1	..	..	..	4	9
Disease of Liver	1	..	..	..	..	1	..	..	..	..	1	..	..	3	..	..	..	..	..	1	..	..	2	..	..	..	..	3	..	..	..	1	..	..	..	..	2	1	2	6	1	..	..	..	..	..	..	..	..	1	..	..	..	..	2	14
Obstructed Bowel—Hernia	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	1	1	..	..	..	3	..	..	..	..	..	1	..	..	..	..	..	1	2	..	..	..	1	..	..	..	..	..	..	..	..	..	1	7
,, VIII.—Disease of Kidneys	1	..	1	..	..	..	1	..	..	..	..	..	..	3	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
Disease of Bladder—Prostrate	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	1	3
Nephria and Albumenuria	1	..	..	..	..	..	..	..	..	..	..	1	..	2	..	..	..	2	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	1	..	..	1	..	2	..	1	..	..	..	..	..	1	..	..	..	..	3	9
Incontinence of Urine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1
,, IX.—Disease of Uterus—Ovaries	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	1	3
,, X.—Disease of Bones and Joints	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	1	3
,, XI.—Disease of Cellular Tissue	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	1	1	3
,, XII.—Premature Birth	1	..	..	2	1	..	..	..	..	1	..	..	..	5	..	..	..	..	1	..	..	1	..	1	1	..	..	4	..	..	..	..	1	..	..	..	..	..	..	..	..	1	1	1	1	..	1	..	..	1	..	2	..	8	18
Teething	..	1	..	..	..	..	1	..	..	..	..	1	2	5	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	1	..	2	..	..	5	1	..	..	..	..	..	..	..	..	1	1	..	3	14
,, XIII.—Childbirth	1	1	..	1	..	..	..	..	..	..	..	..	..	3	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	2	..	..	..	..	..	..	..	..	..	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	7
Paramenia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
,, XIV.—Old Age	1	2	..	2	..	1	2	1	..	..	1	1	..	11	..	1	1	1	1	3	1	..	..	..	1	..	..	9	..	..	1	..	..	..	2	..	..	..	..	..	3	1	1	..	..	..	1	..	1	1	..	1	..	7	30
,, XV.—Atrophy and Debility	..	4	1	3	..	..	3	1	1	3	..	1	..	17	..	1	..	..	..	3	..	1	..	2	2	1	..	10	..	2	..	1	..	..	1	..	..	3	2	2	3	14	1	1	3	..	8	..	1	2	..	2	2	2	1	23	64
Accidentally Killed	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
,, XVI.—Burns—Scalds	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	2	..	..	..	..	1	..	..	4	..	..	..	..	..	..	..	..	..	..	..	..	2	2	1	..	..	1	1	..	..	..	..	..	..	3	10
Drowning—Asphyxia	..	1	..	..	..	..	..	..	..	..	..	..	1	2	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	1	..	..	..	1	3	..	..	..	1	..	..	..	..	..	..	..	..	1	7
Wounds, Blows, Crushes, Falls, &c	1	1	..	..	1	..	1	2	1	..	..	1	2	10	..	..	1	..	2	1	..	..	..	2	1	2	..	9	..	1	..	2	..	..	1	..	..	..	..	1	5	..	..	..	1	..	..	1	..	..	..	..	1	3	27
Suicide	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	1	..	..	..	2	..	..	..	..	..	1	..	..	1	..	..	..	2	..	..	..	1	..	1	..	..	..	..	..	..	2	7
Homicide	..	..	..	..	..	..	1	..	..	..	..	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	3
Murder	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	2	3	..	..	..	1	..	..	..	..	..	..	..	..	1	4
Causes not specified	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	1	..	..	1	..	..	..	..	..	..	..	2	..	..	..	..	..	..	1	..	1	..	..	2	5

TABLE III.

WEEKLY CONDENSED REGISTER OF DEATHS, TOGETHER WITH THE WEEKLY AVERAGES OF METEOROLOGICAL PHENOMENA DURING 1871, IN BIRKENHEAD (AND CLAUGHTON.)

CAUSES OF DEATH.	WEEKS. 1	2	3	4	5	6	7	8	9	10	11	12	13	1st Qr.	WEEKS. 14	15	16	17	18	19	20	21	22	23	24	25	26	2nd Qr.	WEEKS. 27	28	29	30	31	32	33	34	35	36	37	38	39	3rd Qr.	WEEKS. 40	41	42	43	44	45	46	47	48	49	50	51	52	4th Qr.	Year.
I.—Zymotic Diseases	4	6	5	2	5	4	5	5	3	3	2	5	5	54	3	3	1	2	1	4	1	5	3	2	2	3	3	35	3	2	1	3	1	7	8	7	6	12	13	13	78	18	10	22	12	14	12	14	20	17	10	9	10	13	181	348
II.—Diseases of uncertain or variable seat	..	1	..	..	1	1	2	3	..	1	3	..	1	13	1	..	..	..	..	..	..	2	..	..	..	1	..	6	..	..	2	..	..	1	..	1	..	..	1	1	..	6	..	..	..	2	..	..	1	..	1	2	1	1	2	10	35
III.—Tubercular Diseases	4	6	3	4	..	4	4	4	2	2	2	3	6	44	1	2	1	1	5	2	3	8	..	2	1	1	1	33	1	2	..	2	2	4	2	4	..	3	5	..	2	6	31	4	3	4	1	2	4	3	4	1	1	3	3	36	144
IV.—Diseases of the Brain, Nerves, &c	4	1	2	1	5	1	..	3	2	2	3	1	2	32	3	4	4	2	3	4	1	4	4	5	4	3	4	42	1	2	2	3	2	2	2	2	2	2	2	2	2	32	1	3	1	3	1	4	2	2	2	..	1	3	25	131
V.—Diseases of the Heart and Blood Vessels	1	1	3	2	..	..	..	..	1	1	1	2	1	15	1	2	..	1	..	1	..	1	2	..	1	..	..	10	1	..	1	1	..	..	..	..	..	..	1	1	1	7	..	1	..	1	2	1	..	..	..	1	1	..	2	9	41
VI.—Diseases of the Lungs, &c.	4	3	9	11	2	..	3	8	3	4	2	..	5	56	1	..	3	4	1	3	..	5	2	2	4	..	3	3	31	..	1	1	3	1	3	..	..	..	2	1	3	4	19	6	3	5	10	6	2	5	6	4	2	4	4	5	62	168
VII.—Diseases of the Stomach, Liver, &c	1	1	..	..	..	..	..	2	1	2	..	..	..	8	..	..	..	..	2	..	..	1	2	1	1	..	..	9	..	..	..	..	2	..	3	..	1	2	2	1	1	16	1	..	..	..	..	6	..	1	2	1	1	1	15	48
VIII.—Diseases of the Kidneys, &c	2	..	1	..	..	..	..	1	..	..	..	1	..	5	..	..	..	3	..	..	..	..	..	..	..	..	1	4	..	1	..	..	..	..	..	..	1	2	2	..	..	1	1	..	..	..	..	..	..	1	..	..	..	..	1	5	17
IX.—Diseases of the Uterus, &c	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	1	3
X.—Diseases of the Bones, &c	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	1	3
XI.—Diseases of the Skin, Cellular Tissue, &c	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	3
XII.—Premature Birth, Teething, &c.	1	..	1	2	1	..	1	..	..	1	..	1	2	10	1	..	..	..	1	..	..	1	..	1	1	..	..	5	..	..	..	..	1	..	1	1	..	1	2	..	6	2	1	1	..	1	..	..	1	..	1	3	..	11	32
XIII.—Childbirth, and Paramenia	1	1	..	1	..	..	..	..	..	..	..	..	..	3	..	..	..	1	..	..	2	..	..	..	..	..	..	1	..	..	..	..	..	..	2	..	..	..	..	1	..	3	..	..	..	..	..	..	..	..	..	..	1	..	7
XIV.—Old Age	1	2	..	2	..	1	2	1	..	..	1	1	..	11	..	1	1	1	1	3	1	..	..	2	1	..	..	9	..	..	1	..	..	..	..	..	..	..	..	..	..	3	1	1	..	..	1	..	1	..	..	1	..	7	30
XV.—Atrophy and Debility	..	4	1	3	..	..	3	1	1	3	..	1	..	17	..	1	..	..	..	3	..	1	..	2	2	1	..	10	..	3	..	..	1	..	1	..	3	2	2	..	3	14	1	1	3	..	8	..	1	2	..	2	2	2	1	23	64
XVI.—Violence	2	2	..	1	1	..	2	2	1	..	..	1	4	16	1	1	..	..	..	4	1	1	..	..	4	1	2	16	1	..	3	..	..	1	2	..	..	2	..	1	..	7	16	1	..	..	4	2	..	1	1	..	..	..	1	10	58
Not Specified	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	2	..	..	..	..	..	..	1	..	..	..	..	2	5
TOTAL FROM ALL CAUSES	25	28	25	30	15	17	30	25	15	19	9	28	20	286	12	14	12	16	12	25	14	28	12	16	23	14	15	213	6	13	6	16	15	15	13	21	19	19	20	29	41	239	35	24	36	33	42	24	30	41	26	24	25	57	32	399	1137
Males	14	12	17	15	9	8	12	13	7	8	8	15	15	153	7	6	6	3	7	13	7	7	7	8	4	13	8	98	4	6	3	9	7	8	5	16	13	12	14	13	22	127	22	12	17	16	23	11	17	24	12	8	15	18	14	209	587
Females	11	16	8	15	6	9	18	12	8	11	1	13	5	133	5	8	6	13	5	12	7	21	5	8	12	10	6	115	2	7	3	7	8	7	8	5	6	7	6	16	19	112	13	12	19	17	19	13	13	17	14	16	10	9	18	190	550
Westerly Winds (including due South) per cent.	40.4	76.7	33.3	4.7	0.0	53.5	80.3	98.2	39.2	73.2	85.1	44.0	58.9	51.4	59.5	33.7	53.5	72.0	86.9	25.0	79.7	48.8	59.5	41.0	37.5	51.1	64.2	53.7	68.4	77.9	87.5	86.9	55.3	67.1	79.1	50.0	60.1	0.0	41.0	17.2	58.9	76.7	44.2	48.2	60.0	47.6	52.9	19.6	13.6	48.8	94.6	65.5	71.4	47.4
Cloud Averages, per cent.	61.4	57.1	61.4	70.0	97.1	74.2	74.2	71.4	57.1	61.4	64.2	57.1	58.5	65.0	61.4	58.5	84.2	78.5	61.4	42.8	54.2	54.2	37.1	68.5	67.1	67.1	62.3	63.3	70.0	71.4	68.5	62.8	72.8	22.8	48.5	60.0	44.2	67.1	47.1	57.1	78.5	59.3	52.8	44.2	77.1	60.0	52.8	74.2	67.1	47.1	70.0	81.4	60.0	52.8	74.2	71.4	65.2	62.9
Rainfall in inches	0.37	0.40	0.56	0.0	0.26	0.77	0.05	0.17	0.33	0.31	0.50	0.00	0.01	3.73	0.04	0.70	0.39	0.36	0.37	0.0	0.34	0.84	0.02	0.01	0.78	0.24	0.71	0.24	1.32	0.91	0.45	0.83	0.10	0.00	0.43	0.71	0.24	0.82	0.00	0.73	2.39	8.74	2.21	0.20	1.74	0.59	0.48	0.34	1.18	0.14	0.08	0.38	0.11	0.34	0.82	8.88	27.3
Rainfall in hours	12.5	13.7	15.5	0.0	15.7	7.4	2.5	4.7	9.3	13.4	0.0	0.0	0.5	104.8	1.0	17.9	16.3	12.5	7.6	0.0	7.4	10.1	1.4	0.4	15.1	9.5	9.5	13.2	22.4	18.2	12.4	11.5	0.5	0.0	9.3	9.5	9.5	6.8	0.0	16.2	35.9	153.6	24.4	3.7	32.0	23.1	12.5	7.3	12.1	5.1	1.0	0.38	11.6	10.2	15.1	165.7	541.7
Thermometer Means	32.7	36.7	35.3	31.0	41.5	33.8	46.0	44.9	45.8	47.0	42.1	42.5	44.3	40.8	43.9	49.2	50.0	50.3	50.1	50.5	50.0	56.8	57.6	53.3	59.5	54.8	58.3	52.6	59.6	61.2	61.0	58.1	60.2	68.1	63.3	60.0	62.3	58.7	58.6	51.6	48.5	59.3	51.1	49.4	53.7	51.5	46.5	41.7	40.2	37.2	36.8	34.0	43.0	42.6	42.5	43.7	49.1
Thermometer Means (20 Years') Averages	38.8	38.7	39.0	39.5	39.7	39.5	40.6	40.6	41.5	41.8	41.9	42.5	44.3	40.6	45.9	46.9	47.5	48.0	49.1	51.2	53.4	55.0	56.1	56.9	57.7	59.0	59.8	52.8	59.3	61.0	61.1	61.3	61.6	61.4	61.8	60.0	60.0	58.0	57.0	56.0	54.8	59.4	53.2	51.8	50.3	48.6	46.8	44.9	43.5	42.6	41.9	41.9	41.3	40.0	39.3	45.1	49.5
Barometer Means	29.904	29.799	29.229	30.113	30.022	29.820	29.986	30.109	30.033	29.784	29.872	30.068	30.238	29.917	30.049	29.849	29.630	29.811	30.032	30.212	30.023	30.035	30.235	30.096	29.873	29.819	29.949	29.954	29.810	29.866	29.922	29.595	29.878	30.144	29.883	29.908	30.151	29.876	30.209	29.953	29.610	29.908	29.516	30.237	29.835	30.116	29.938	29.768	30.072	30.067	30.139	30.293	30.363	29.891	29.636	29.992	29.943

	1871
TOTAL FROM ALL CAUSES	1137
Males	587
Females	550

TABLE IV.

Analysis of Fevers, and of some other "Headings" in Tables I. and II.

Headings.	Diseases.	Sex.	Years of Age.	Week.
Fevers.	Continued Fever	F	2	3rd
	,, ,,	F	5	7th
	,, ,,	F	31	7th
	,, ,,	M	43	19th
	Typhus Fever	F	24	21st
	,, ,,	M	16	27th
	,, ,,	F	29	31st
	,, ,,	M	31	33rd
	,, ,,	F	67	37th
	,, ,,	M	10	41st
	Enteric Fever	F	9	29th
	,, ,,	M	45	42nd
	,, ,,	F	17	44th
	,, ,,	M	11	49th
	Remittent Fever	M	4	3rd
	,, ,,	F	2	26th
	,, ,,	M	9	41st
Suicide by	Drowning	F	50	4th
	Shooting	M	23	21st
	Cutting Throat	M	36	34th
	Strangulation	M		44th
	Prussic Acid	M	23	37th
	Jump out Window	M	40	34th
Homicide by	Exposure.	M	1 day	13th
	Narcotism.	F	5 weeks	7th
	Murder.	F	43	28th
,, Bowel.	Perforation	M	8	6th
,, ,,	Obstruction.	F	21	8th
,, ,,	Std. Hernia	M	28	16th
,, ,,	Stricture	M	33	44th
,, ,,	Intusception	M	67	39th
,, Heart.	Pericarditis	M	6	26th
,, ,,	,,	M	24	27th
,, ,,	Angina Pectoris	M	61	44th

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TABLE V.

STREET REGISTER OF DEATHS.

Streets.	Total from all Causes.	From Zymotic Causes only.	Streets.	Total from all Causes.	From Zymotic Causes only.
Abbey Street	3	1	Wynnstay Street	2	1
Abbot Street.....	5	1	Ruthin Street ...	2	1
Albion Street	8	1	Borough Hospital...	11	1
Albert Terrace ...	2	0	Bridge Street	7	2
Albion Terrace ...	2	1	Bridge End Trace	2	1
Castle Buildings	6	2	Bright Street	7	4
Hamilton Terrace	1	0	Brook Place	5	2
Wilbraham Ter.	5	1	Brook Street.....	39	18
Alexandra Road ...	1	1	Brook Square ...	3	2
Alfred Road	3	1	Lydia Terrace ...	1	0
Alma Street	1	0	Brougham Street ...	4	1
Argyle Street	2	1	Byrom Street	4	1
Arthur Street	2	0	Cambridge Place ...	5	2
Ashville Road	3	2	Camperdown Street	3	0
Back Beckwith St.	6	0	Canning Street.....	1	0
Back Camden Street			Cardigan Street ...	11	5
Campbell Terrace	2	0	Catheart Street.....	9	3
Back George Street	1	1	Club Row	8	5
Back Oliver Street	3	2	Catherine Street ...		
Back Price Street...	7	2	Belgrave Terrace	1	0
Back St. Anne St.	5	1	Chapel Street	8	1
Ball's Road	1	0	Ackworth Place...	1	0
Barton Street	5	1	Chester Street	19	6
Beckwith Street ...	19	5	Mersey Place ...	1	0
Byrom Place.....	2	1	Chester Place ...	1	1
Bedford Street.....	2	0	Eton Place	5	2
Bentinck Street ...	5	0	Windsor Place ...	2	1
Bentinck Terrace	1	0	Christchurch Road	2	0
Bertha Street	8	0	Church Street	7	5
Birkenhead	68	0	Clarendon Street ...	4	1
Blackpool Street ...	1	0	Claughton Road ...	19	6
Ruabon Street ...	2	1	Claughton Village...		
Wrexham Street	1	1	Rimmer's Cottages	2	1
Denbigh Street...	6	5	Scott's Place	1	1

Table V.—*Continued.*

Streets.	Total from all Causes.	From Zymotic Causes only.	Streets.	Total from all Causes.	From Zymotic Causes only.
Clayton Street	1	0	Grange Lane	16	3
Cleveland Street ...	9	4	Grange Mount	1	0
Clifton Crescent ...	2	0	Grange Road	6	1
Conway Street	11	1	Grange Street	4	0
Kent Place	1	0	Greenfield Street ...	8	2
Conway Place ...	2	1	Grosvenor Place ...	1	0
Corporation Road...	1	0	Halkin Street	1	0
Cottage Street	4	3	Hamilton Square ...	4	1
Cromwell Street ...	1	0	Hamilton Street ...	2	0
Taylor's Buildings	4	2	Hamilton View...	1	1
Cross Street	2	0	Hemingford Street	1	1
Crown Street	7	5	Henry Street	6	1
Daere Street.....	2	1	Hope Street	8	2
Dale Street	2	1	Wilton Street ...	1	1
Davies Street	2	0	Horatio Street	1	0
Derby Street.....	3	0	Howard Street	2	1
Devonshire Place ...	3	0	Ivy Street.....	7	1
Devonshire Road ...	2	1	Jackson Street	2	1
Sandyway.....	2	0	James Street	1	1
Dock Cottages	19	8	Kendal Street		
Duke Street	1	0	Whitfield Place...	2	2
Edgar Street.....	8	3	King Street	2	0
Egerton Street	13	5	Knox Street	3	0
Carpenter's Row	3	1	Prospect Place ...	2	1
Connor's Court...	1	0	Laird Street	4	1
Meacock's Court	1	1	Leicester Street ...	5	1
Eldon Place	5	2	Leicester Terrace	1	2
Elgin Street	2	0	Livingstone Street	9	0
Elizabeth Place.....	1	0	Lord Street	3	1
Elizabeth Street ...	4	1	Lower Ivy Street ...	2	1
Exmouth Street ...	8	4	Lowther Street.....	3	1
Euston Grove	1	0	Marion Street	5	0
Field Street	15	8	Market Place South	1	1
Flamank Street ...	19	7	Market Street	15	1
Fore Street	3	0	Brunswick Avenue	1	3
Forest Road	1	0	Marshall Street.....	4	0
Frederick Street ...	7	2	Meadow Street.....	3	1
George Street	7	5	Meacock Street.....	1	0
Gladstone Street ...	5	2	Midland Street	1	0
Glover Street	2	1	Milton Street	7	2
Grace Street.....	1	1	Moon Street	8	2

Table V.—*Continued.*

Streets.	Total from all Causes.	From Zymotic Causes only.	Streets.	Total from all Causes.	From Zymotic Causes only.
Mornington Street	4	1	Reedville	2	0
Morpeth Dock	1	0	Richmond Cottages	2	1
Myrtle Street	4	1	Robert Street	1	0
Nelson Street	5	0	Rose Brae	1	0
Neptune Street.....	2	1	Rose Street	4	2
Oak Street	12	7	Russell Street	5	2
Old Bidston Road...	7	3	Salisbury Street ...	2	1
Cumberland Place	1	0	Samuel Street	1	0
St. Mary's Terrace	1	0	Shotwick Street ...	1	0
Old Chester Road...	7	1	Shrewsbury Road...	1	1
Mathew's Place...	1	1	Somerville Street ...	4	3
Old Priory	2	0	Shaw's Place.....	1	0
Oliver Lane	1	0	St. Aidan's Terrace	3	1
Oliver Place	3	1	Stanley Road	1	0
Oliver Street.....	22	4	St. Anne Street ...	36	13
Miller's Place ...	2	0	St. Mary's Gate ...	5	1
Oxton Road	14	3	Priory Court.....	4	2
Oak Bank.....	1	1	Hughes' Build'gs	2	0
On a Steamer off Ireland	1	0	St. Mary's Av'nue	2	0
Park Road East ...	2	0	St. Mary's Street ...	3	2
Park Road South ...	3	0	Sun Street	7	0
Park Road West ...	2	2	Sussex Street	1	1
Park Street	6	1	Taylor Street	2	1
Mason's Court ...	1	0	Thomas Street	13	6
Parkfield	1	0	Tranmere Vale	3	1
Parkfield Place...	1	0	,, Vale Terrace	1	0
Plymouth Place...	2	2	Upper Beckwith St.	2	0
Parkfield Avenue ...	3	1	Upton Road	2	0
Peel Street	6	1	Rock Terrace ...	1	0
Pilgrim Street	1	1	Vicker Street	3	2
Pleasant Street.....	1	0	Victoria Wharf.....	1	0
Pool Street	4	1	Vincent Street	2	2
Pool Terrace.....	1	0	Vine Street	8	2
Price Street	27	5	Vulcan Street	6	2
Myrtle Place.....	1	0	Walton Street	8	4
German Terrace			Warwick Street.....	14	7
Prince's Street	1	1	Waterloo Place.....	3	0
Prince's Terrace ...	1	1	Rushton's Court	2	0
Queen Street	1	0	Watson Street	16	7
Queensbury Street	3	3	Oakfield View ...	2	0
			Orderly Home ...	2	2

Table V.—*Continued.*

Streets.	Total from all Causes.	From Zymotic Causes only.	Streets.	Total from all Causes.	From Zymotic Causes only.
Orderly Residence	2	1	Wilkinson Street ...	3	1
Orderly Avenue	3	3	Willaston Place ...	2	1
Wesley Street	3	1	William Street	9	1
Westbourne Road...	4	1	Wilson Street	5	2
Whetstone Lane ...			Windsor Street.....	6	2
Whetstone View	1	0	Wood Street.....	6	0
White Street.....	7	4	Morpeth B'dings	9	5
Wilbraham Street...	2	0	Woodchurch Road	1	1

NOTE.—Twelve cases of fatal Small pox were also removed to the Union Hospital, from the following places, viz.:—Brook-street, 2; Brunswick-avenue, 2; Brassey-street, 1; Church-street, 1; George-street (Wilkes'-court), 1; Market-street, 1; Morpeth-buildings, 1; Oliver-street, 1; Price-street, 1; and Vicars-street, 1.

TABLE VI.

(Lunar) Monthly Table of Total and Zymotic Deaths, with the rates per 1,000 per annum.

1870.	Total No. of Deaths.	Rate per 1,000	No. of Zymotic Deaths.	Rate per 1,000.
1st Month ending January 28th...	108	31	17	4·8
2nd ,, February 25th	87	25	19	5·4
3rd ,, March 25th ...	71	20·4	13	3·7
4th ,, April 22nd.....	58	16·6	12	3·4
5th ,, May 20th	67	19·2	8	2·3
6th ,, June 17th	79	22·7	12	3·4
7th ,, July 15th	48	13·8	13	3·7
8th ,, August 12th ...	52	14·9	7	2·
9th ,, September 9th	72	20·7	28	8·
10th ,, October 7th ...	131	37·6	56	16·1
11th ,, November 4th...	135	38·8	58	16·6
12th ,, December 2nd	121	34·7	63	18·1
13th ,, ,, 31st*	108	31·0	42	12·
	1187	25·1	348	7·6

* The 13th month contains one extra day.

TABLE VII.

Occupations of Persons who either themselves, or Members of whose Family, died during 1871.

Accountants	5	Colliers	2
Agents	7	Confectioner	1
Artists	2	Coopers	6
Auctioneer	1	Dealers	3
Bailiff	1	Dock Gatemen	2
Bakers	16	Drapers	3
Barman	1	Dressmakers	4
Blacksmiths	24	Driller	1
Boatbuilders	2	Dyer	1
Boatmen	10	Editor	1
Boilermakers	42	Engine Drivers	11
Bookbinder	1	Engineers	5
Book-keepers	13	Engine Fitters	18
Brass Founders	3	Engine Turner	1
Brewers	3	Farmers	4
Bricklayers	9	Farriers	3
Brickmakers	3	Feather Dresser	1
Brokers	11	Ferry Manager	1
Builders	5	Fishermen	2
'Bus Driver	1	Flatmen	3
Butchers	7	French Polisher	1
Cabinet Maker	1	Gardeners	7
Car Drivers	7	Gas Inspector	1
Car Owners	5	Gasfitters	2
Carters	13	Gatekeeper	1
Cashier	1	Gentlemen	4
Caulkers	3	Glassmaker	1
Charwoman	1	Grocers	9
Chemists	4	Grooms	6
Chimney Sweep	1	Gunsmith	1
Clerks	11	Hairdressers	5
Coach Builders	5	Hammermen	2
Coachmen	5	Horse Keeper	1
Collector	1	Housekeepers	3

Table 7.—*Continued.*

Iron Dealer	1	Sawyers	3
Iron Monger	1	Schoolmasters	3
Iron Moulders	6	Seamen	31
Iron Plater	1	Servants	25
Iron Turners	3	Shepherd	1
Joiners	26	Ship Carpenter	1
Labourers	327	Ship Chandler	1
Lath-cleaver	1	Shipkeeper	1
Letter Carriers	2	Shipowners	3
Limeburner	1	Shipriggers	3
Machinists	6	Shipsmiths	4
Magistrate	1	Ship Stewards	5
Manufacturers	3	Shipwrights	67
Mariners	13	Shoemakers	30
Master Mariners	5	Shopmen	2
Merchants	23	Slaters	2
Milk Dealer	1	Soldier	1
Millers	4	Stevedore	1
Milliner	1	Stokers	15
Millwright	1	Stonemasons	20
Ministers	2	Storekeepers	4
Missionary	1	Strikers	2
Moulder	1	Surgeons	5
Painters	16	Tailors	16
Pattern Maker	1	Tallow Chandler	1
Paymaster	1	Teacher	1
Pensioners	7	Timekeepers	3
Photographer	1	Tinworkers	2
Plasterers	3	Travellers	5
Platelayers	3	Unknown	10
Plumbers	9	Upholsterers	2
Policemen	12	Warehousemen	5
Porters	16	Watchmakers	3
Poulterers	2	Watchman	1
Printers	3	Watermen	7
Provision Dealers	3	Well Sinker	1
Publicans	9	Wheelwright	1
Railway Officials	9	Whitesmiths	6
Rope Maker	1	Window Blind Maker	1
Saddlers	2	Wireworker	1
Saw Maker	1		

THE WORK OF A MEDICAL OFFICER OF HEALTH, AND HOW TO DO IT.

I AM induced to lay before you the following remarks, from the fact of my having received lately very many inquiries from my brother associates as to what the duties of a Medical Officer of Health were, and how they were to be done. I will hope that it will not be considered presumptuous on my part thus to lay my views before you, when I tell you that, for the last twenty-four years, I have been a watchful student of the causes deteriorating the Public Health, and for the last seven years have held the medical officership of health in my native town, Merthyr-Tydfil.

The Duties of a Health Officer.—These have been briefly, yet comprehensively, stated in the minute adopted by the Local Board of Health of Merthyr, in January, 1866.

"1. To ascertain what local causes prejudicially affect the public health in this district, to inform the Board of these discovered causes, and to suggest such means for their removal as medical science can advise.

"2. To seek information of the occurrence of cases of epidemic, endemic, or contagious diseases, and when informed to visit the localities, ascertain the extent of the malady, the local causes likely to conduce to the diffusion thereof, and give such warning as may induce the persons affected to have recourse to medical treatment. In case of an outbreak of small-pox, to inquire into the history thereof, and as to the practice of vaccination in the neighbourhood.

"3. To inspect any meat exposed for sale for human food, whenever required so to do by an officer of this Board, or any police officer, and to give his opinion as to the fitness or otherwise of such meat being used for human food, whenever required by a Justice of the Peace.

"4. Upon any complaint received by him of the emission of any noxious or offensive smell from any process of trade carried on in any manufactory, yard, house, or premises, or of atmospheric pollution from any drains or sewers, to inquire into the causes, and report upon the means for the prevention thereof.

"5. To perform any duties imposed by any Act of Parliament on the Officer of Health, or Sanitary Inspector.

"6. To attend the meetings of the Local Board when necessary.

"7. To report quarterly the nature and amount of sickness and death, the number of births, and of persons vaccinated; and to present annually a report and tabular return of the ascertained sickness and mortality of the district."

The foregoing being a summary of the duties, let me tell you how I have endeavoured to carry them into practical working. Under the seventh heading, it will be observed that quarterly and annual reports had to be prepared and presented to the local authority. After consulting the admirable reports of Dr. GEORGE BUCHANAN, formerly Medical Officer of Health of St. Giles, and Dr. HENRY LITTLEJOHN, Health Officer of the City of Edinburgh, I adopted a form of report (a copy of which I lay before you), which I have continued to use and to present to my Board each year. By passing in review the several chapters and sections into which this report is divided, I shall be able, I trust, to convey to you some idea of the subjects with which a Medical Officer of Health will have to become acquainted, and to inform you of the sources from which the desired knowledge may be obtained.

A report on the sanitary condition of a town or district should, in the *first* place, show the numbers of the people, their ages, occupations, characteristics of their dwellings, geological formation of the soil on which those dwellings are placed, the watershed of lands, the aspect of those lands and of the habitations of the people, and the varying

meteorological conditions, such as rainfall, exposure to particular winds, variations of temperature, etc., to which the population are exposed.

In the *second* place, statistical information should be given of the marriages, births (legitimate or illegitimate), vaccinations, and deaths.

Under a *third* head should be included all those external circumstances which affect the health of man, such as the quality, sufficiency, and price of food, and the means of earning such sufficiency; the quality and quantity of the water-supply; and the mode of disposing of refuse.

Lastly, the sanitary works that are in progress, or are desirable, the legislative powers which have been given or are wanted, the practical working of the statutes giving those powers, and the imperfections observed in their application; these all require elucidation, and should be plainly set before the governing authority.

Let me now proceed to point out, how the work summarised in the foregoing paragraphs is to be done.

Population.—This will be ascertained from the returns of the last Census, and the most ready sources of information are: 1 The Quarterly Returns of the REGISTRAR-GENERAL. These are published at a very small cost; the numbers to be ordered for this year, would be Nos. 93, 94, 95, and 96, which last will be issued on February 1st, 1873. 2. The Annual Reports of the REGISTRAR-GENERAL. The last published is for the year 1869, and is numbered 32. For details of population, inquiry should be made of the Superintendent-Registrar of the district; this officer can readily give the numbers of houses in each hamlet or tything or subdivision, the number of separate families, and the totals of these in each sub-registration district. Most Unions publish half-yearly, "Abstracts of Poor-law Relief," and generally much useful statistical information is printed therein.

Ages and Occupations of the People.—For these, for the present, the census-returns of 1861 must be sought out. I fear that many of these valuable documents will have passed to the butter-merchant; at least, I have wholly failed to obtain copies of certain numbers. These returns are published in *volumes*, and in *tables*; "Volume 3, General Report" and Tables 1, "Areas, houses and population," and 2, "Ages, civil condition,

occupation, and birthplaces of the people," are the portions, the study of which is essential to the full knowledge of the proclivities of the population to diseases by reason of their residences, ages, or occupations. These tables are published in "Divisions," which correspond in number with those used in the Quarterly Returns already referred to; thus all the details relating to the south-western counties would be found in "Division 5," while those of Monmouthshire and South Wales are contained in "Division 11."

Geological Formation of the Lands.—This would be learned from the coloured Ordnance maps, and from the special sections published by the SURVEYOR-GENERAL. Local inquiries would quickly bring to light any peculiar formation or deposit, such as clay-bands preventing the downward passage of water, or the hard "pans" of certain districts in Surrey and elsewhere.

The Watershed of the surface lands should be carefully ascertained, especially of those areas on which tenements have been built; the aspect of the various sub-divisions into which the district may, by natural boundaries, be separated, and of the lines of streets in these sub-divisions, should be carefully noted, so that their exposure to particular winds, and hence the liability of the inhabitants to particular acute diseases, may be borne in mind. The elevation of these various sub-divisions above the sea-level would also need to be ascertained.

The Meteorological Conditions of the district, such as the atmospheric pressure, prevalence and force of winds, degree of humidity, daily temperature and rainfall, all should be accurately observed and recorded. The books published by Mr. G. J. SYMONS will be the safest guides as to the modes of observing and recording, while BUCHAN'S *Handy Book of Meteorology* will afford the fullest information.

The Water Supply of the district should next engage the Health-Officer's most earnest attention. Diligent personal inquiry will be needed to collect all the information attainable as to the sources whence the waters are drawn, the quantities obtainable, and the purity of the supply. The works of reference to which he should have recourse for guidance, are PARKES on *Practical Hygiène*, BOWMAN'S *Practical Chemistry*, and (with especial

reference to the polluting presence of ammonia), WANKLYN'S *Treatise on Water-Analysis*.

Habitations of the People.—The sanitary condition of each house in the district should be carefully inquired into. This inquiry could not economically be done by the Health Officer himself, but can be efficiently arrived at by entrusting the house-to-house inspection to competent observers, appointed and paid by the local authority, and directed by the medical officer. Such an inquiry was made in Merthyr in the autumn of 1866; nearly 10,000 houses were examined and reported on by four intelligent persons; five weeks were occupied in the examination and report, the cost to the Local Board being £25. This inquiry embraced the following:—The name of the street, number of each house, names of occupier and of owner, number of family and of lodgers; the ventilation, how it was secured, whether by back doors, or by windows whose upper sashes could be fully let down; the number of privies or of water-closets, and the state of these; the water-supply, whence derived, and the state of any back premises, noticing particularly whether any animals or poultry were kept there. When these returns were completed, they were tabulated by the medical officer, for *each street* in *each district*, and the results summed up. The usefulness of these returns has been continuous. They now afford standpoints of reference whence to mark the improvements made, and to note the dark spots that call for amendment; by referring to this "Dictionary of Habitations," the state of each house is at once apparent, and upon the occurrence therein of any case of disease, such as, *e. g.*, enteric fever or phthisis, the exciting cause, whether excrementitious exhalations, or dampness of foundation, may be found.

Drains and Sewers.—The Town Surveyor would be the person from whom all details, connected with the drainage and sewerage of the district may be learned. The lines of these, their formation, the kinds of gully-traps and closet-pans used, the connections between the sewers and cesspools, (if any), the condition of these polluting collections, their contiguity to wells or springs, or dwellings; these matters each need, and should have the most careful consideration.

Having thus obtained a full knowledge of the factors of diseases which surround man in his dwelling, and in his journeyings, the Health-

Officer should next proceed to seek for statistical information as to the marriages, births, vaccinations, and deaths, which have been recorded in the district assigned to his supervision. The sources of information on all these matters are, in each registration district or sub-district, the Superintendent-Registrar, or the District Registrar of births, marriages, and deaths.

Marriages, Births, etc.—The number of births should be ascertained weekly by returns from the District Registrar, and should be classified for male and female, and legitimate or illegitimate. The number of marriages would be given quarterly, on application to the Superintendent Registrar, who can also supply a return of the numbers of children, etc., successfully vaccinated. The ages, under one year and above one year, would also be given; by comparing the number under one year of age vaccinated in each quarter with the number of children born in the previous quarter, the Health Officer would be able to form an opinion as to whether the practice of vaccination was or was not sufficiently carried out. The death-roll should also be obtained weekly from the District Registrar. The return should state the date of death, the residence, names, age, sex, and occupation of the deceased, the cause or causes of death, and whether such cause had been certified by a registered medical practitioner, or by a coroner, when an inquest had been held. I lay before you a blank form of the return which I use. The cost of the weekly returns of births and deaths is £8 per annum; the mean number of births being 2000, and of deaths 1400, out of a population of 50,000. To obtain these returns, application should be made to the Registrar-General by the local authority; the consent being obtained, the District Registrar would weekly fill in and forward the returns, the Local Board remunerating him for his labour, and of course providing him with the forms in blank.

Having obtained these returns, and learned by careful perusal the diseases which have proved fatal, the Health Officer should make note of every case of *presumed preventable disease*, and inquiry should be at once instituted into all cases of epidemic contagious fevers. Indeed, a diligent and constant study of these death-rolls will quickly direct the attention of the Health Officer to the plague-spots of his district; and, when his attention has been once drawn to them, he will not cease to seek for the

causes of disease, and, when they are discovered, he will continuously endeavour to get them removed.

The *Tabulation of the Mortality Returns*, according to districts and streets, etc., will occupy very much of the time of the Health Officer; but it is absolutely necessary that this should be done, as without such a sorting of the causes of death, and setting down to each locality its due share of the gross mortality, no man can fully perceive the close connection between insalubrious houses, or courts, or alleys, and the death-rate in such places. My habit has been to set down under each division of the district the details of the mortality of each week; thus: Week ending——, male or female, age, cause of death, age at death. Summing up these each quarter, I obtain the numbers of males and females, the numbers under and over five years, the causes of deaths, and the total of years lived by the whole number. This total, divided by the whole number, yields the average age at death. From this district ledger (as it were), I post all cases of death into the several headings of the general mortality table, placing opposite the name of each disease, under one of the several ages, the score of the particular death of the male or female. The sum of the deaths from each cause, the sums of the deaths from each class of disease, and the total of deaths would be brought out in the columns on the extreme right; while the base line of each column would show the mortality at each age. The table at the end of my second annual report will illustrate my description.

A glance at tables so constructed would point out the excess or diminution of deaths from all causes, and from particular causes. Thus the facts that particular diseases had increased, or diminished, would be plainly displayed. The books which would guide a medical officer in preparing such abstracts of mortality, are: 1, the *Nomenclature of Diseases*, as published by the Royal College of Physicians; and 2, the Annual and Quarterly Reports of the Registrar-General, already referred to.

Passing on to the *third* heading, the *Food of Man* should occupy the earnest attention of the Health Officer; the quality of the main articles of food by which human life is supported—flour, oatmeal, potatoes, meat, etc.—should be inquired into. In Dr. Parkes's work already named, all the

needful instructions for ascertaining the purity or otherwise of these may be obtained. In addition to ascertaining the quality of the food, the Health-Officer would also inquire into the *quantity* of food supplied; this will largely depend upon the *prices* of food. These may be learned by personal enquiry of the dealers, and also from the Clerk to the Guardians: this Officer would give copies of the prices paid for articles of food obtained by the Guardians. These prices may be taken as a fair average of what is paid in the district for the food consumed by its inhabitants. The *means* whereby man obtains his food should next be inquired into; what may be the *rate of wages* earned by the working men in the several branches of trade or commerce carried on in the district would call for much personal inquiry on the part of the Health Officer. The replies obtained would enable him to form a fair comparison of the rate of wages with the price of food; the conclusion which he may deduce therefrom should be fully set forth. Under this heading should also be considered the *numbers of the paupers* permanently and casually relieved in the district. These numbers would be a very safe criterion of the prosperity or otherwise of the trade and commerce carried on. The facts required may be learned from the half-yearly abstracts published by the Boards of Guardians. To the question of the water supplied to a district, I have already alluded.

The concluding subject of inquiry comprises the progress in sanitary works, and the working of the legislative powers given by the statutes.

Having carefully mastered the various details above-named, with much labour and long toil, the Health-Officer would endeavour to form some notion of the executive duties he would have to perform. Here, primarily, he should bear in mind this golden rule: the Health-Officer is the *medical adviser* to his Board, and should not, in any instance, proceed to any *action* until so directed by order of his Board. It is not, therefore, necessary that he should seek for nuisances, or interfere in any way in the duties apportioned by the Board to the Surveyor, or to the Inspector of Nuisances; but as it is necessary that he should be kept thoroughly informed upon every matter relating to the health of the inhabitants, it is absolutely requisite that one (or more, according to the size of the district) Inspector of Nuisances should be placed under his control. The duties of this official would be to inquire into and discover all nuisances, inspect houses let in lodgings and

common lodging-houses, diligently seek information of houses overcrowded, visit the localities in which fevers may be prevalent, see to the removal of the fever-stricken to hospitals, inspect slaughter-houses and market-places; in fact, he should be the ever-ready assistant of the medical officer in seeking for the causes which prejudicially affect the public health. The salary of the Inspector, who is subordinate to the Health-Officer at Merthyr, is twenty-seven shillings per week; he is supplied with one suit of clothing annually, and, for additional services during epidemic outbreaks, has received donations of money.

In order that the Medical Officer of Health may know what are nuisances, what are the obligations of landlords and tenants, and what are the modes of procedure by which the former may be removed and the latter fulfilled, it is necessary that he should have a clear apprehension of the laws relating to Public Health and Local Government. In GLEN'S work on this subject, a most complete, accurate, and understandable digest of these laws will be found. A promise has been made by the head of the Local Government Board that a synopsis of these laws shall shortly be published; when the promise is fulfilled, doubtless much of the uncertainty which now attends the practical application of the statutes will cease.

Having thus sketched out—I trust not too tediously—the various duties of the Health Officer, I will, in conclusion, add but two or three remarks.

First, as to the amount of time and labour that a medical man would have to devote to the proper carrying out of the work I have described. Taking my own sphere of labour as the basis, I would say that a district such as Merthyr-Tydfil is—of 18,000 acres in area, 3000 acres being occupied by houses and gardens, with a population of 50,000, living in 10,000 separate tenements—the time occupied to do the work efficiently would not be less than one hundred days, allowing ten hours of labour each day.

The costs of the work in Merthyr are £8 a-year paid to the Registrars of Births and Deaths, an allowance not exceeding £10 a year to the Medical Officer for the purchase of books, instruments, chemicals, stationery, and for the printing of the annual report, and the medical

officer's salary of £100 a year; giving a total of £118. You will understand that the Medical Officer's services are not remunerated at their commercial value.

Secondly, as to the nature of the work which will be required of the Health Officers of the future. As yet this has not been officially defined, and, therefore, I would earnestly press upon my medical brethren generally not to be too hasty in tying themselves to undertake labours of which they do not know the extent and character.

The Local Government Board have announced that rules and regulations to be observed by local authorities (desiring pecuniary aid in payment of the salaries of Health Officers and Nuisance Inspectors) are being prepared; it would, therefore, be prudent if both authorities and medical men would wait until those rules shall have been made public. This is more especially necessary, since the Inspectors appointed by the Central Board will have large means granted them to enforce the efficient carrying out of the Sanitary Laws.

All these are subjects of congratulation to those who have the well-being of their fellow countrymen at heart; and it is to be hoped that the responsible chief of the department, in selecting these divisional officers, whose duty it will be to advise, assist, instruct, gently press, or cogently reason with district authorities, will not be tempted humbly to imitate a practice which is said to have prevailed in the Grand Duchy of "Nebel-und-Regenstein," where "*it had long been admitted that the necessity for knowing anything about the functions one might be called upon to discharge, was an exploded fallacy.*"

Outline of Report upon the Sanitary Condition of———, during the year—, by———, Health Officer.

Duties of Medical Officer as defined by local authority.

Chapter I.—Numbers, etc., of the Population, Geology, Watershed, and Aspect of District; Natural Divisions thereof; Habitations of the People; Rainfall, Temperature, etc.

Section 1.—Population; area of district.

Section 2.—Ages and civil conditions of people.

Section 3.—Sanitary topography of whole district, and of divisions, etc.

Section 4.—Habitations of the people, characteristics as to site, structure, dampness, ventilation, drainage, etc.

Section 5.—Commen lodging-houses, houses let in lodgings, slaughter-houses, markets, etc.

Section 6.—The weather, rainfall, temperature.

Chapter II.—Water-supply, Food, Wages, Pauperism.

Section 1.—Water supply; quality and quantity, etc.

Section 2.—Prices of chief articles of human food, and adulterations thereof.

Section 3.—Wages of labouring population, in each of the particular classes of labour in district.

Section 4.—Number of paupers relieved.

Chapter III.—Statistics of Marriages, Births, Vaccinations, and Deaths.

Section 1.—Marriages.

Section 2.—Births, legitimate and illegitimate.

Section 3.—Vaccinations.

Section 4.—Deaths from all causes in whole district.

Section 5.—Ditto, ditto, in each division of district.

Section 6.—Ditto from each class of disease in whole district, and in each division of district.

Section 7.—Ditto from epidemic contagious disease in each division of district.

Section 8.—Ditto from tubercular diseases in each division.
Section 9.—Ditto from lung diseases, etc.
Section 10.—Ditto from accidents.
Section 11.—Ditto of illegitimate children.
Section 12.—Ditto in union workhouse, gaol or hospital.
Chapter IV.—Sanitary Improvements, etc.
Section 1.—Sanitary works during year.
Section 2.—Sanitary works needed.
Section 3.—Practical working of sanitary laws.
Section 4.—Amendments desirable.

Summary.—Comparison of rate of Increase or Decrease of Numbers of People; Increase or Decrease of Rate of Marriages, Births, Deaths, Causes of Increased Mortality (if any); Remedial Measures necessary for Removal of Causes, etc.

Appendix.—Table showing Causes of, and Ages at Death from each Class and Order of Disease.

Form of Weekly Return to be made by Sub-district Registrars.

District of————. Sub-district of————. Return of Number of Births and Deaths during the week ending Saturday, the ———day of ———, 18—. Births: Legitimate, M., —, F. —,—; Illegitimate, M, —, F., —, —; total, ——. Deaths: Male, —, Female, —, —; total, ——.

(The Medical Officer will be glad to have this return every Monday.)

Particulars of Deaths Registered in the week: Register No.; when died; residence; names; sex; age; occupation; causes of death (1, 2); duration of diseases (1, 2); certified or not, or inquest.

Liverpool

DISINFECTING ESTABLISHMENTS

Erected from Designs by the Borough Engineer.

The first disinfecting apparatus was erected at the north end of the town, on a piece of land in Ford Street, 60 feet by 40 feet. It comprises a house for the keeper, a free public wash-house, containing six washing troughs, for the cleansing of infected clothing; a boiler-house with drying closets over the boiler, heated by means of a steam coil; and four disinfecting stoves. These are contained in an open shed; they are constructed of cast iron plates bolted together, and made perfectly steam tight with an outer and inner casing, between which the steam is admitted at a regular pressure of 5lbs., which raises the temperature of the air in the stoves, when the sliding doors are closed, to about 200 degrees Fahrenheit.

The pressure of the steam is regulated by one of Farren's patent equilibrium valves, fixed on the steam pipe.

The internal dimensions of the stoves are 4 feet 6 inches by 3 feet, by 6 feet high.

The steam boiler is cylindrical, 3 feet 6 inches diameter, and 7 feet long; the steam generated therein is used to boil the water in the washing troughs as well as to heat the stoves.

The accompanying drawings will explain more fully the general arrangements.

This apparatus has been opened nearly a year, and was extensively used with the best results during the late cholera epidemic. Up to the present date, 17,606 articles have been disinfected free of cost.

REFERENCE TO THE DRAWINGS.

a Keeper's Cottage.
b Yard to ditto.
c Court Yard.
d Disinfecting Stores.
e Wash-house.
f Boiler and Steam Coil.
g Drying-rooms.
h Cold Water Tank.

In the apparatus for the south end of the town, the disinfecting stoves are constructed on a different principle to that of the Ford Street establishment; the other arrangements are somewhat similar.

The plot of land on which the buildings are erected is situate in New Bird Street, with a frontage thereto of 56 feet, and extending backwards to the depth of about 70 feet. They comprise a spacious flagged court yard with paved cart way, a residence for the keeper, a well ventilated receiving room for infected clothes, a depository for disinfected clothes, a wash-house for cleansing infected clothing, containing 8 washing troughs supplied by steam from the boiler in the basement, a drying closet opening directly into the wash-house, and a range of disinfecting chambers under the open shed in the court yard.

In the basement are the boiler, stoking pit, heating apparatus, and the coal and ash vaults.

The disinfecting stoves are each 5 feet wide, 7 feet from front to back, and 6 feet 6 inches high to the springing of the arch.

The walls and vault are built of brickwork, the doors are of wrought iron, fitting tightly into cast iron frames.

The floors are formed with double iron gratings, having alternate openings; the under one being constructed so as to slide to exclude if desired the hot air.

In the arch over the centre of each stove is an opening, containing an iron valve for the escape of foul air into an exhaust flue, which is carried over the top of the stoves into the chimney shaft.

Within the thickness of the front wall of each stove, a thermometer is fixed, protected from contact with the outer air by a thick plate of glass.

The drying closet in the wash-house is of a similar construction, with the addition of light wrought iron sliding clothes horses.

The heating apparatus is a cast iron cockle, patented and manufactured by Messrs. Tessimond and Kissack. Two cast iron smoke tight flues are connected therewith, which after forming a coil are conveyed along the hot air chamber under the stoves into the chimney at the opposite end.

The furnace doors and ash hole are each regulated by means of sliding dampers.

Cold air is drawn from the atmosphere, through a descending shaft, thence along a brick flue, underneath the floors of the stoke hole into a cavity, on each side of the cockle, after passing which it is highly heated and conveyed into a chamber, extending underneath the whole length of the stoves and drying closet, and from which it is admitted into the stoves through the sliding gratings before mentioned.

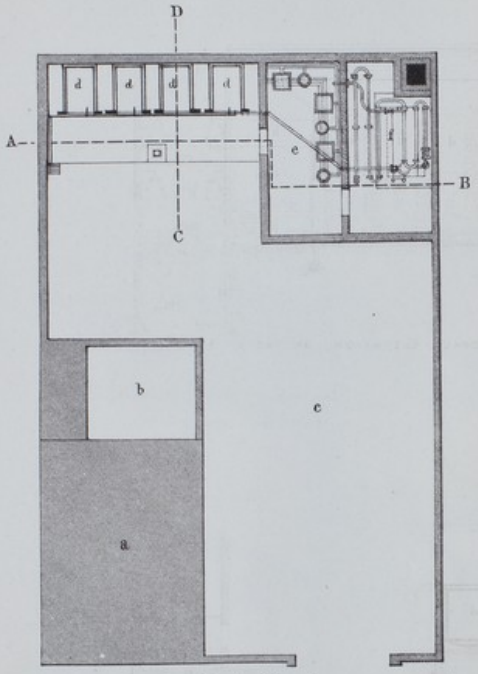
The temperature of the air is regulated by means of a damper at the entrance to the cold air flue. As many as 380 degrees fahr. have been registered in the drying closet over the cockle, and 280 degrees in the stoves.

REFERENCE TO THE DRAWINGS.

a Court Yard.
b Keeper's Cottage.
c Yard to ditto.
d Receiving House for Infected Clothes.
e Depository for Clothes after they are Disinfected.
f Wash-house.
g Drying Closet.
h Disinfecting Stoves.
i Boiler.
j Stoke Hole.
k Heating Apparatus.
l Coals.
m Ashes.
n Cold Air Shaft.
o Cold Air Flue.
p Hot Air Chamber.
q Exhaust Flue.
r Chimney Shaft.
s Cistern.

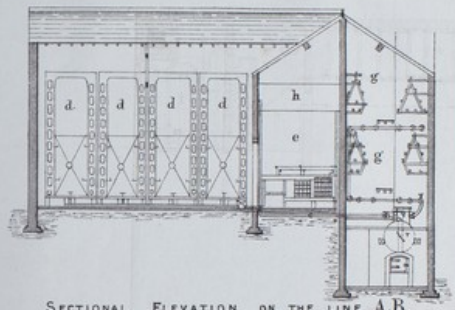
Liverpool, March, 1867.

DISINFECTING APPARATUS, FORD ST.

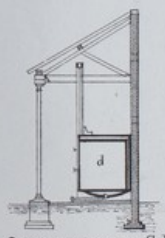


Ford Street

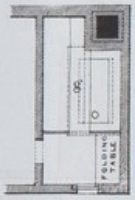
GROUND PLAN.



SECTIONAL ELEVATION ON THE LINE A.B.



SECTION ON LINE C.D.



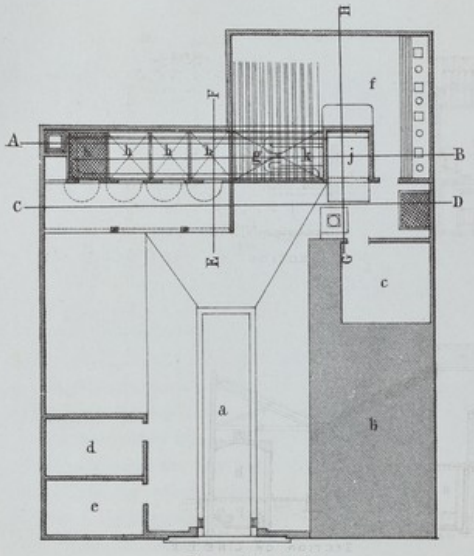
PLAN OF DRYING ROOM

SCALE OF FEET

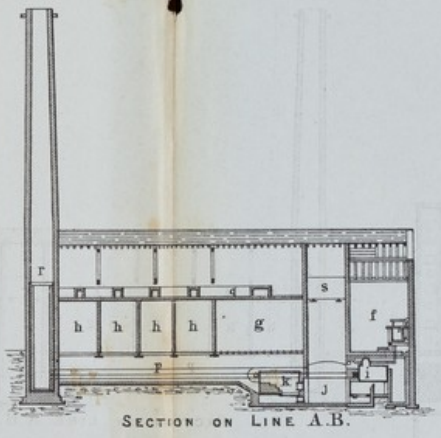
0 5 10 20 30 40 50

Jas. Newlands C.E. Archt.

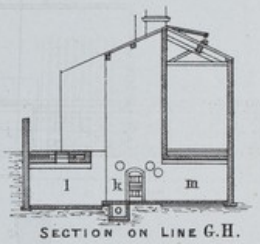
DISINFECTING APPARATUS. NEW BIRD ST.



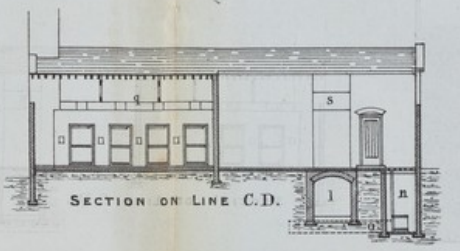
New Bird St
GROUND PLAN.



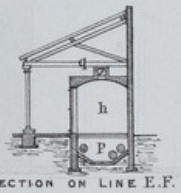
SECTION ON LINE A.B.



SECTION ON LINE G.H.



SECTION ON LINE C.D.



SECTION ON LINE E.F.

SCALE OF FEET

J. MORGAN, DEL.

JAS. NEWLANDS, C.E. ARCHT.



"On the Downward Intermittent Filtration of Sewage, as it is now in practical operation at Troedyrhiw, near Merthyr-Tydfil."

The great leader of the "Constitutional" party recently called attention to a statement made by a Liberal Member of Parliament, that their policy was a "policy of sewage." "To certain persons," he said, "it might be a policy of sewage, but to one of the labouring "multitude of England, who has found fever always to be one of "the inmates of his household, who has year after year seen stricken "down the children of his loins, on whose sympathy and material "support he has looked with hope and confidence, it is not a policy "of sewage but a question of life and death." To you, my medical brethren, this "policy of sewage," this question of life and death, will come irresistably home, for you know how many thousands of our fellow-citizens are annually stricken by enteric fever, by diarrhœa, and by other maladies which have their origin in the putrefactive fermentation of human excretions; you know how entirely these maladies are preventible, how easy of application are the means of prevention, and how successful they are when

properly and sufficiently applied: you, I am sure, will not fail to enter earnestly and wisely into the consideration of those means which may best carry into practical working this "policy of sewage." The increasing cry from the occupants of towns is "get rid of excrementitious matter." Sanitarians constantly utter the same note. The land hungers after the natural fertilizer, and men, good, and skilled, and earnest, are busy in the search for the best means to convey to the hungry soil that which man would be rid of. I will not presume to occupy your time in detailing the many expedients that have been suggested for fulfilling the desired end. The A.B.C. process; Bird's sulphate of iron and clay; the deposition of the sewage slush in tanks, and drying it; the conversion of the same slush, deposited by the action of lime and clay, into a water-proof cement for walls and buildings; these, and many others, have doubtless been brought before your notice.

My purpose is to tell you, as briefly as I can, our experience in Merthyr. Placed in Chancery for further polluting the already polluted river Taff, by pouring the strained sewage of the town thereinto, the Local Board of Health had to devise means to obviate this pollution.

Application was made to Parliament in the early part of the Session of 1870, for powers to take land to be used as irrigation lands: the necessary plans having been prepared by the Town Surveyor. The Act was obtained in August in that year, and power was given to take 393 acres of land. The action of the Local Board in thus seeking for and obtaining the necessary powers to do away with the nuisance complained of was not considered sufficiently speedy by the relators in the Chancery Suit, and a renewed application was made in November, 1870; then by order of Lord Justice James, we were placed under the professional care of Mr. Bailey Denton, who, after due consideration, recommended that the new remedy suggested by Dr. Edward

Frankland should be tried at Merthyr. Happy the man, still happier the town, who passes safely through the pains and penalties incidental to the tentative use of a new remedy. It has been successful with us; the cost has, it is true, been great, but the cure is, I believe, perfect.

It is necessary that I should, before briefly telling you the mode of treatment adopted by the eminent civil engineer I have named, epitomise that part of the report of the Rivers Pollution Commission, which treats of the clarification of sewage by filtration through certain kinds of soil. The experiments which demonstrated the relative values of the various modes of filtering sewage were devised and conducted by Dr. Edward Frankland, one of the Commissioners. At page 62 and the following pages, in the first part of the first volume of Reports and Plans, published in July, 1870, it is stated, "That finding, from preliminary trials, "that filtration, properly conducted, is a most efficient means of "purifying sewage, an extensive series of experiments were made, "in order to determine, first, the best material to be used as a "filtering medium; second, the amount of sewage which can be "effectively purified per cubic yard of material; and third, the best "mode of conducting the filtration The first set of experiments "was made with two glass tubes, each sixteen feet long by two "inches in diameter. One was filled with sharp silicious sand, the "other with a mixture of sand and coarsely-powdered chalk. "London sewage was made to pass continuously upwards through "these tubes so as to exclude air, and subsequently downwards in successive doses through both, so as to cause the air "to follow the sewage down the tube between each two consecutive "doses." The results, as shown by analysis, were that four-fifths of the organic nitrogen and ammonia, contained in the sewage before filtration, passed out in the effluent water, thus showing that the generation of nitrates and nitrites took place only when the pores

of the sand still contained air. I am sure I need not remind my audience that it is by the conversion of the various forms of nitrogen that exist in sewage into inorganic salts, by combination with soda, or potass, or lime, that the purification is effected. A second series of experiments was made with the same tubes containing like materials; but the filtration was downwards and intermittent. "The results of these experiments were to prove that intermittent "downward filtration effects a very satisfactory purification of the "water, when the amount of sewage does not exceed 5½ gallons "per cubic yard of filtering material in every 24 hours; and further "show, by the presence of nitrogen in the forms of nitrates and "nitrites, that the process is essentially one of oxidation. The "organic matter in the sewage stream being, to a large extent, "converted into carbonic acid, water, and nitric acid; hence the "necessity for the continual aeration of the filtering medium, which "is secured by intermittent downward filtration."

The experiments, the results of which I have just now stated, demonstrated the best *means* of filtration; the next inquiry was as to the best *mode* of filtration. For this series of experiments, glass tubes were obtained, each 6 feet long by 10½ inches in diameter, open at the ends and placed upright, their lower ends resting on shallow earthenware trays. A layer of small pebbles was placed at the bottom of the tubes, and upon these a stratum, 5 feet thick, of the soil which was to be tried as a means of filtering the sewage. On the top of the earth used a layer of fine sand was put to prevent the coarser indissoluble matters suspended in the sewage from passing into the soil. The sewage was poured on the top of the cylindrical tube, and when it had percolated through the 5 feet of earth, was conducted into a receiver, and the contents analysed. The flow of the sewage continued for 12 hours: then an interval of 12 hours took place. At the expiration of this rest, the flow of the sewage recommenced for a like period, followed by a like intermission, and so on. The soil in these tubes was used for two years continuously; the pores of the soil were not choked, nor was there any diminution of the clarifying power of the soil. Earths from many different localities, and differing largely in chemical composition were obtained. Each was subjected to a series of carefully conducted, and accurately noted experiments. The operations were continued through many months, and the effluent water, obtained from each experiment, carefully analysed. The full account of these various operations may be read in the volume I have quoted.

The conclusions arrived at, may be thus summarised:—"Sewage "traversing a porous and finely divided soil undergoes a process "to some extent analogous to that experienced by blood in passing "through the lungs in the act of breathing. A field of porous "soil, irrigated intermittently, virtually performs an act of respira-"tion, copying on an enormous scale the lung-action of a breathing "animal, for it is alternately receiving and expiring air, and thus "dealing as an oxidizing agent with the filthy fluid which is "passing through it. The action of earth as a means of fil-"tration must not be considered as merely mechanical; it is "chemical, for the results of filtration, properly conducted, are "the oxidation, and thereby the transformation, of the offensive "organic substances, in solution in the sewage stream, into ferti-"lizing matters, which remain in the soil, and into certain harmless "inorganic salts, which pass off in the effluent water."

The following are the conditions necessary for the successful conduct of downward intermittent filtration of sewage:—1. The soil of the land to be used must be porous. 2. A main effluent drain, which must not be less than six feet from the surface, must be provided. 3. The surface of the soil to be so inclined as to permit the sewage stream to flow over the whole land. 4. The filtering area should be divided into four equal parts, each part to be irrigated with the sewage for 6 hours, and then an interval of 18

hours to elapse before a second irrigation takes place; each of the four parts would thus be used for 6 hours out of the 24. An acre of land so prepared would purify 100,000 gallons of sewage per day. Thus far I have epitomized the results obtained by the investigations made by Dr. FRANKLAND, and the conclusions therefrom.

I must now ask your attention to a few remarks culled from a paper read at Maidstone on the 24th November, 1870, by Mr. BAILEY DENTON, "On the selection of suitable land for sewage irrigation." Mr. DENTON, having quoted fully the experiments published by the Rivers Pollution Commission, proceeds to apply his own very great and valuable experience in land draining and cultivation to the subject under discussion. Premising that when downward filtration is to be used, it is to be considered that such filtration must be intermittent, in order to allow the complete aeration of the filtering bed, between each passage of the sewage through it, he proceeds to discuss the question—"Can clay act equally well with sand as a filter," and "can the air penetrate it with equal facility, so that the necessary oxidation may take place?" He states the answers to these questions thus:—To utilize sewage, it is necessary that a soil should be finely comminuted so as to allow the passage of the fluid; that its power of retaining fertilizing substances should be effective; that the under drainage of the soil must be sufficient to prevent the water of attraction from rising above the limit which will allow the free discharge from the area of the filtering bed; and, lastly, that the surface soil must be so stirred and lifted by cultivation, to a depth of at least 16 inches, and so treated afterwards as to maintain that pulverisation, so that this 16 inches of soil is converted into a porous thick covering, interposing between the open atmosphere and the subsoil. The principle of drainage is to secure the active percolation of the fluid to be clarified through the soil to the very

base of the filter; and by duly placing the service carriers of the sewage to be delivered and distributed, by giving the proper direction and slope to the lands over which it has to pass, and by making drains at proper intervals, to provide for that regular passage of the sewage from the carriers along and through the soil, into the drains, and thence outwards to the efflux, so uniformly that no clogging of the surface, and therefore no ponding or accumulation of the sewage can take place." These principles are pithily exemplified in a remark made by the late Lord PALMERSTON to Mr. BAILEY DENTON:—"Every good gardener has now rejected the saucer to the flower pot. He supplies his plants with water from above, taking care that there is proper drainage below."

Before relating to you the special adaptation of the means of filtration, I must ask your notice to these extracts from the Commissioners' reports. At page 70 it is said: "Nevertheless, there "are three formidable objections to the general adoption of this pro- "cess. 1st. It is entirely unremunerative, the amount of sewage "applied to a given area of land being probably in such a case too "great to admit of the growth of any ordinary agricultural crop. "2nd. The whole of the manure ingredients of the sewage would be "absolutely wasted, and 3rd. The collection of the solid fæcal matters "upon the surface of the soil, with no vegetation to make use of "them, would probably give rise to a formidable nuisance, especially "in hot weather. We also entertain doubts as to the process being "equally successful under ordinary management on a large scale, "since the sewage would be likely to pass through the land in an "unequal manner."

That the fears of the Commissioners have not been realized will be demonstrated by what follows.

1.—*Straining Tanks.* When late in 1869 we were fortunately placed under the care of Mr. BAILEY DENTON, there were (near the lands then partially used for irrigation with sewage) two Straining Tanks, which our Surveyor, Mr. SAMUEL HARPUR, had constructed many months before, and which were then in use. In forming these Tanks, the object Mr. HARPUR had in view was to strain from the sewage stream as much as possible of the floating and suspended matters; and in order to determine the precipitation of a portion of the matters dissolved in the sewage stream, and also to hasten the deposit of the suspended matters, lime, mixed with water, was added to the stream during the day-time, at about 150 yards above the strainer. The quantity of lime added averaged four grains per gallon.

The Straining Tanks are made of stone, the bottom paved, the the top of wooden planks, easily removed. Each is 200 feet long, five feet wide, and five feet deep. Along the floor of each tank an 18-inch square drain of open work is formed. The tank is divided into three bays by open brickwork. Between the sides of the drain, and between the walls of the tank, and over the drain to a depth of 12 inches over the whole length and width of the tank, the spaces are filled with broken furnace cinders. The sewage, charged with lime, passes into the tank, percolates through the broken cinders, passes through the perforations in the walls of the under drain, and then flows onward to the conduit conveying it to the land. Upon the surface of the cinders all the gross and solid portions of the sewage are left. Each tank works four or five days, in that period arresting in transit about 2 tons a day of sewage slush and refuse. This is taken off the surface, wheeled in barrows into a field close at hand, and mixed with fresh coal ashes (about 3 tons), brought daily from the neighbouring village of Troedyrhiw by the public scavenger. When a tank has been in use three or four days there is found on the surface of the cinders

an inch or more of sand. In this district it is a custom to have "a nicely-sanded floor." Doubtless the deposit on the filter is largely derived from this source. In the conclusion of the paper I shall again have to allude to its presence, and to its use.

2.—*The Filtering Areas.* About 20 acres of the land, immediately adjoining the road on which the tanks are placed, have been arranged into filtering areas or beds on a plan devised by Mr. J. BAILEY DENTON * The land is a loamy soil, 18 inches thick, overlying a bed of gravel. The whole of these 20 acres has been under-drained to a depth of from 5 to 7 feet. The lateral drains are placed at regular distances from each other, and run towards the main or effluent drain. This is everywhere 6 feet deep. The surface of the land is formed into beds; these have been made to slope towards the main drain by a fall of 1 in 150. The surface is ploughed in ridges; on these vegetables are planted or seeds sown; the line of the ridged furrow is in the direction of the under drain. Along the raised margin of each bed in each area delivering carriers are placed, one edge being slightly depressed. The strained sewage passes from the conduits into the delivering carriers, and, as it overflows the depressed edges, runs gently into and along the furrows down to the lowest and most distant part of the plot. The sewage continues to be so delivered for 6 hours; then an interval of rest of 18 hours takes place, and again the land is thoroughly charged with the fertilizing stream. The water percolates through the 6 feet of earth, and reaches the lateral drains, which convey it to the main effluent drain.

The result of this plan of disposing of sewage, by downward intermittent filtration, may be seen in this sample of the effluent water taken from the outlet of the main drain on the 16th July. You will observe that the water is bright, perfectly pellucid, free from smell, and tastes only of common salt. It may safely be

* See Plan which Mr. DENTON has permitted me to insert.

drunk; in fact, is used by the workmen employed on the farm. During the process of irrigation no nuisance is caused, for the soil quickly absorbs all the fluids passed on to it; in fact, in two or three hours after the water has ceased to flow on the land, an observer would say that the ground had not been wetted for days. The workmen say that no unpleasant smell is noticed, nor has the health of the persons employed, in any one instance, been affected by any presumed poisonous exhalation. The only imperfection of the plan is that at the end of the furrows, nearest the lowest corner of a plot, a slight deposit of scum is found. This scum is formed by the fine insoluble precipitate caused mainly, I believe, by the addition of lime to the sewage stream. On the ridges of this prepared soil, cabbages, broccoli, carrots, turnips, parsnips, beans, peas, lettuces, onions, &c., are grown; of some of these, samples are placed before you.

A few pages back I read to you the unfavourable opinion which the Commissioners held as to the practicability of their laboratory experiments. The paragraphs I have now read demonstrate that the evils they anticipated have not happened. By passing the sewage through the simple inexpensive strainers devised by Mr. Harpur, Mr. Bailey Denton has caused it to be delivered on the land in such a state that no nuisance or inconvenience results. By growing vegetables on the ridges, Mr. Bailey Denton has proved that the unfavourable opinions once held by the Commissioners may be set aside.

3.—*Irrigation Land.* Adjoining the filtration areas, the town Surveyor has laid out 55 acres to be used as irrigation lands. The whole has been drained by deep lateral drains running towards the main effluent drain. The principle adopted in the filtration areas, of allowing the sewage stream, flowing over each square yard of surface, to percolate through two

cubic yards of soil, and thence to pass into the efflux, has been faithfully carried out, and the results, in every point of view, have been as satisfactory as those afforded by the filtration areas.

In addition to these 55 acres, 160 acres of the lands taken under the powers of the Act of Parliament are now being prepared as irrigation lands; thus with the 20 acres of filtering areas, 235 acres of land will eventually be used for the reception and utilization of the strained sewage of about 40,000 persons.

Having spoken of the parentage, birth, and education of this system of disposing of sewage, it remains only now to show you what are the results obtained. These I will most briefly state under the heads of chemical, money, and general results.

1.—*Chemical Results.* On the slips of paper,* which I will ask you to look at, are the chemical changes that have taken place. Take first the amount of solid impurities: the proportion per 100,000 parts in sewage was 51.6; in the effluent water it was reduced to 34 parts. Thus about 2-5ths of the quantity of solid impurity dissolved in the sewage was retained in the soil. But, really, the amount is much larger, for turning to the quantity of combined nitrogen, 3.419, in the strained sewage, and noticing that only 0·402 parts (barely half a part) were found in the effluent water, your knowledge of chemical action will induce you to conclude that a considerably larger quantity of the fertilizing impurity, soluble in the sewage water, had been removed by passing through the soil, and that its place had partially been taken by the lime added to promote the clarification of the sewage. And this is so, for before the addition of lime, the sewage water contained 15 parts of lime in the 100,000; after liming this was increased to 20 parts, while in the effluent water the lime represented 18 parts of the 34. *Organic Carbon:*

* See Analytical Table at End.

The amount of this permitted, by the proposed standard of purity of a drinkable water, is 2 parts in 100,000. Before filtration the sewage water contained 2.035 parts of organic carbon, thus very slightly exceeding the standard permissible quantity; but by the process of filtration through the soil, this was reduced to 0.286, that is one-eighth only of the permitted standard quantity. As to the several forms of nitrogen, organic nitrogen, ammonia, nitrogen as nitrates and nitrites, the proportion is but 1½ part in 100,000; while of combined nitrogen the effluent water contains only one part in 250,000.* Then, as to the matters in suspension in the filtered stream, the mineral and organic amounted to 15.62 parts in the 100,000; in the effluent water, traces only, too minute to estimate, were observed.

Regarding the whole analysis, it will be observed that the fertilizing organic matters contained in the filthy sewage stream are eliminated therefrom by percolation through the strata of earth, are retained by the soil, and that what passes off in the clear effluent water are, almost wholly, harmless *in-organic* salts. In concluding this subject, I will read an extract from a letter I have received from Dr. EDWARD FRANKLAND. In it he says: "Of the "effluent water from these downward filtering areas, the result is "highly satisfactory, more so even than that which I had before "obtained in the laboratory of the Rivers' Commission. Indeed,

* *Quantity of Sewage per square yard.* There is a difficulty when speaking of millions of gallons and proportion of hundreds of thousands in at once gripping mentally the quantities we have to deal with. I would therefore ask attention to the following "*reductions*" of the quantities spoken of in this paper.

The outpour, during 24 hours, of a total quantity of one million gallons of sewage on the whole of twenty acres, would be equal to the watering of each square yard with ten gallons of water. Each square yard therefore would only receive the quantity of solid impurity which might be dissolved or suspended in that amount of water. Taking the quantity of solid impurity to be 60 parts in 100,000 parts of water, the proportion per gallon would be 6 grains; and in 10 gallons, 600 grains. The weight of these 600 grains would be a little over three-fourths of an ounce, the measure would be about 6 teaspoonfuls. Of the 600 grains, 80 (1½ teaspoonfuls) would be organic fertilizing matter, and 270 grains (4½ teaspoonfuls) mineral or insoluble matter. A portion of land 3 feet long by 3 feet wide, and drained to a depth of 3 feet, would contain 54 cubic feet of earth.

The practical question arises, Would a portion of land, of the size and cubic contents named, so deal, *daily* with ten gallons of water, containing in solution or suspension, one and a half teaspoonfuls of sewage impurities, as that no hurtful impurity shall be found in the water flowing therefrom? Fifteen months practical working of the filtration areas at Merthyr, authoritatively answers in the affirmative.

"on the 10th June, 1871,* the water entering the Taff, from the "Merthyr intermittent filters, was considerably purer than the "Thames water, which we are often compelled to drink in London."

2. *Money Results.*—Upon ten acres of the land prepared according to Mr. BAILEY DENTON'S plans cabbages were planted, and mangolds sown, in June, 1871. On the 30th August, 77 days after the commencement of planting &c., part of the crop was offered for sale by auction, and realised £17 15s. per acre. In the present year the whole of the 20 acres are under crops. I have been informed by our surveyor that from some of the divisions planted with cabbages the average gross return will be £27 an acre. A small plot, on which broad beans are being grown, has been sold for £40 an acre. On the 55 acres of irrigated land the crops are more productive. Italian ryegrass will yield five crops this season, averaging 60 tons an acre, and yielding a net profit of £24 an acre. A plot of cabbages (48 perches) planted in October, has yielded a gross sum averaging £43 an acre. A plot of onions has lately been sold at the rate of £64 an acre.

3. *General Results.* These may be summarised in the words of the Rivers Pollution Commissioners, lately presented to Parliament: "The experience of these filter beds at "Merthyr has made plain what the experiments in our laboratory "had previously established. Towns can cleanse their sewage "within a much less quantity of land, than any experience hitherto "had, might lead them to expect. Sewage irrigation (in which "the quantity of land thus used bears a large proportion to the "volume of the sewage cleansed,) offers the great advantage of a "remunerative return. Intermittent filtration (in which the quan-"tity of land employed bears a very much smaller proportion to

* At this time the whole of the sewage stream, 800,000 gallons per day, was being passed through ten acres of prepared land.

" the volume of the sewage to be cleansed,) may also now be confi-
" dently accepted as a sufficient remedy for the sewage nuisance.
" These two methods are essentially one, wherever thorough drain-
" age accompanies—as it always should—the extensive form of
" irrigation, and they are the only methods which are perfectly
" trustworthy for the abatement of this sewage nuisance."

In summarising these remarks, I would lay before you the following propositions as conveying my notions of a perfect system for the disposal and utilization of excreta :—1. In order to diminish and limit to the smallest possible degree the chemical action which results when human or animal excretions are dissolved in water, the transmission and delivery of the sewage water on the land prepared for its reception should be effected in the shortest possible time. By means of the system of sewers and drains planned and formed by our town surveyor, the time occupied by the water in passing from the furthest point (5 miles) of the system to the filtering areas does not exceed two hours. 2. The sewage water should be delivered on the land in such a state that the rootlets of plants can at once absorb and assimilate it. In our old botanical studies you will remember that we were taught that each rootlet of a plant, formed of cellular tissue, was closed at its extremity, that is, was covered as the papillæ of the tongue are by mucous membrane, or as the end of the finger is covered by the skin. We were also taught that the fluids on which plants live were absorbed through the substance of that covering tissue, hence it was only that which was dissolved in water that the rootlet could take up. 3. I hold that no attempt should be made to precipitate from the sewage water any of the fertilizing materials it holds in solution, for as sewage water does not hold in solution more of these fertilizing matters than the earth can store, or the rootlets of a plant absorb, so to precipitate therefrom any of the dissolved matter is a waste of the fertilizing material. 4. All insoluble matters floating in the stream should be

removed by mechanical means* The extractor invented by Mr Baldwin Latham seems well fitted for the purpose. 5. All fertilizing matters, as yet undissolved, suspended in the stream, should be removed by proper filters, and then treated by such chemical and mechanical means as may tend to render them soluble. The filters formed by Mr. Harper, and in use at the filtering areas, with the addition of the layer of sand, which comes down with the stream, fulfils the first of these requirements well. The second is a desideratum. 6. The sewage water thus freed from insoluble matters, and from soluble matters as yet undissolved, being passed on to lands, prepared according to the principle suggested by Dr. Edward Frankland, and carried out according to the scheme of Mr. J. Bailey Denton, should so pass on to, through, and out of the soil, as to leave no scum on the surface of the soil, nor any polluting substance in the effluent water.

From these propositions you will understand that I hold that the addition of lime, alumina, or any other chemical to the sewage, with the view of causing precipitation, is wrong in principle, and for these reasons: to precipitate, as I have already said, from solution in the sewage water that which we need for fertilization is a waste, and therefore an error: next, the precipitation of these soluble matters increases the sewage slush, and renders necessary the formation, at a great cost, of tanks for the reception of the deposit: lastly, in order to diminish the nuisance they would otherwise occasion, it is necessary to add deodorants to the precipitating matters: most of these deodorants virtually destroy the fertilizing property of the deposit.

* *Catchpits:* The suggestion made by Mr. Bazalgette, in his evidence on the Birmingham Sewage Bill is one that demands the early attention of the sewer authorities, it is, that "*catchpits of a sufficiently large size should be made to arrest the passage of road dirt-stone, &c., into the sewers*" By the adoption of some such adequate means of arresting insoluble and mineral matters, the quantity of sewage sludge to be retained by the strainers would be reduced, and the surface of the strainers being covered with straining materials composed of finer particles than those now in use, more of the suspended matters would be arrested, and the water would run clear on to the land.

By carefully straining all extraneous insoluble matters from the sewage stream; by filtering all undissolved but yet soluble matters therefrom; by treating these undissolved fertilizing matters separately, by means calculated to promote their solubility: by these processes, a sewage water should be obtained which may safely be passed on to land properly prepared.

To engineers I would present this as a need to be supplied: discover the best means of rapidly separating insoluble extraneous matters from the stream.

To chemists I would say: tell us what are the best materials for the rapid filtration of the stream so strained; and tell us, also, what are the means that should be used to render the hitherto undissolved fertilizing matters quickly soluble in water.

To all interested in this subject, I would say: study the principle proclaimed by Dr. FRANKLAND: study the practical application of that principle, as demonstrated by Mr. BAILEY DENTON; study the action of the simple and inexpensive filters constructed by Mr. HARPUR—always remembering that sewage water must go to the rootlet of the plant, and that for this purpose it must be fresh, free from extraneous matter, and free from precipitates.

The man who can fully carry out these principles may confidently affirm that he has a perfect knowledge of the "policy of sewage."

Farrant and Frost, Printers and Stationers, 135, High Street, Merthyr.

R 100,000. *Dr. Ed. Frankland.*

	Total Combined Nitrogen	Chlorine	Suspended Matters.		
			Mineral.	Organic.	Total.
	nlimited.	Unlimited.	3·00	1·00	
	4·780	7·00	6·68	10·12	16·80
	·349	3·00	trace.	trace.	traces.
	2·058	5·25	7·88	6·56	14·44
	·455	2·60	trace.	trace.	traces.
	3·419	6·12	7·28	8·34	15·62
	0·402	2·80	trace.	trace.	traces.
	5·454				
	0·688				

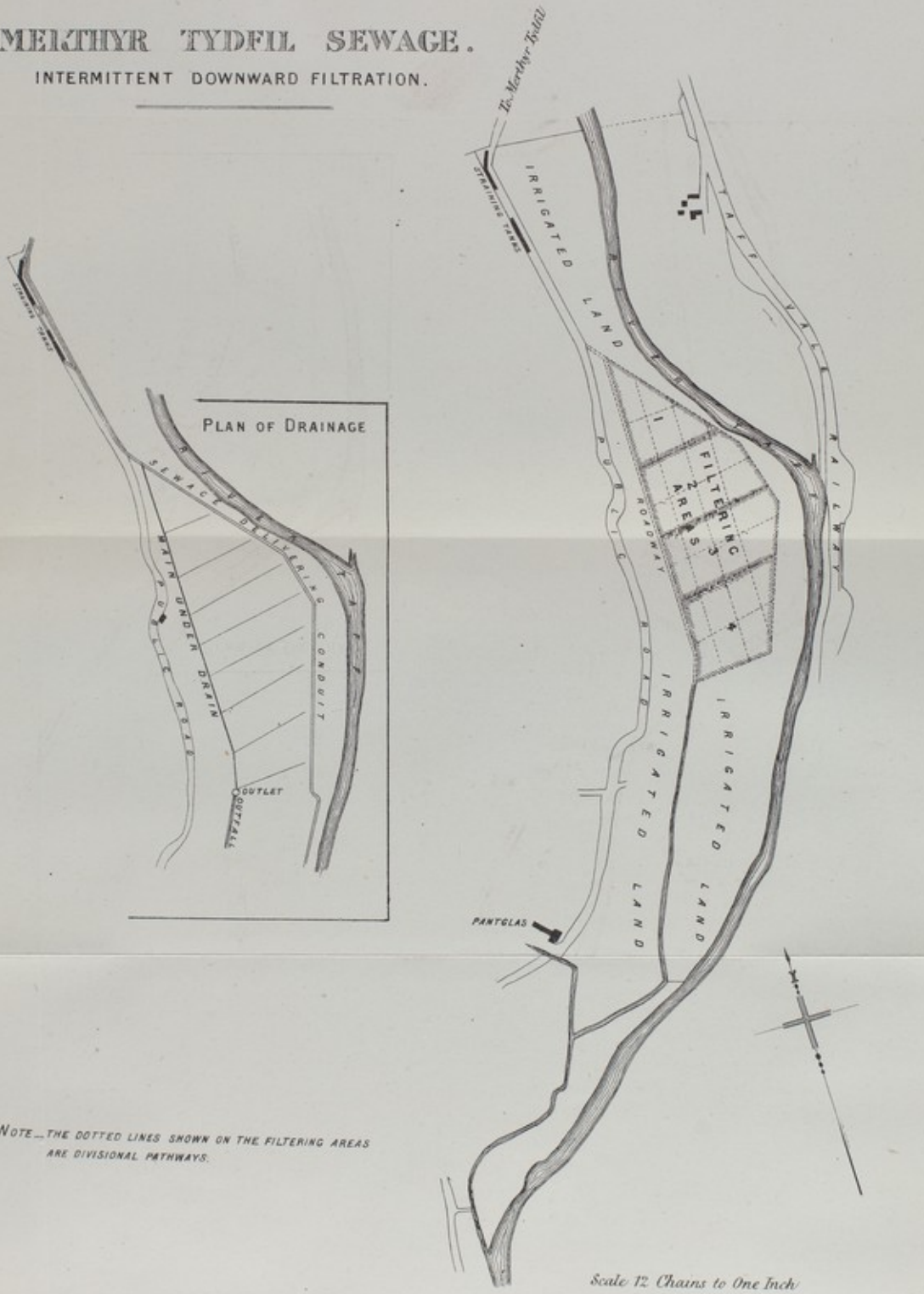
Note.

RESULTS OF ANALYSIS EXPRESSED IN PARTS PER 100,000. *Dr. Ed. Frankland.*

DESCRIPTION.	Total Solid Impurity.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen as Nitrates and Nitrites	Total Combined Nitrogen		Chlorine	Suspended Matters.		
									Mineral.	Organic.	Total.
Permitted by proposed Standards of Purity	Unlimited	2·000	·300	Unlimited.	Unlimited.	Unlimited.		Unlimited.	3·00	1·00	
Merthyr Sewage, after treatment with Lime, but before Intermittent Filtration, June 19th, 1871	54·00	2·788	·783	4·854	0	4·780		7·00	6·68	10·12	16·80
Ditto after Intermittent Filtration „ „	34·60	·249	·056	·075	·231	·349		3·00	trace.	trace.	traces.
Merthyr Sewage, after treatment with Lime. but before Intermittent Filtration, October 20th, 1871.....	49·20	1·282	·952	1·280	·052	2·058		5·25	7·88	6·56	14·44
Ditto after Intermittent Filtration „ „	33·48	·323	·107	·058	·300	·455		2·60	trace.	trace.	traces.
Mean of Sewage after addition of Lime	51·60	2·035	·867	3·067	·052	3·419		6·12	7·28	8·34	15·62
„ „ after Intermittent Filtration	34·04	0·286	·081	0·066	·265	0·402		2·80	trace.	trace.	traces.
Total Organic Matter, after Liming							5·454				
„ „ After Filtration							0·688				

MERTHYR TYDFIL SEWAGE.

INTERMITTENT DOWNWARD FILTRATION.



NOTE.—THE DOTTED LINES SHOWN ON THE FILTERING AREAS ARE DIVISIONAL PATHWAYS.

Scale 12 Chains to One Inch

BAILEY DENTON SON & NORTH
22 WHITEHALL PLACE
LONDON

OUTLINE

OF

PRELIMINARY REPORT

ON THE

Sanitary Condition

OF THE DISTRICT OF

A UNION MEDICAL OFFICER,

BY

THOMAS JONES DYKE, F.R.C.S., Eng.

PRESIDENT OF THE SOUTH WALES AND MONMOUTHSHIRE BRANCH OF THE BRITISH MEDICAL ASSOCIATION, MEDICAL OFFICER OF HEALTH, MERTHYR-TYDFIL.

MERTHYR-TYDFIL: FARRANT & FROST.
LONDON: SIMPKIN, MARSHALL, & Co.

1872.

Merthyr-Tydfil, 14th December, 1872.

Dear Sir,

A meeting of "Union Medical Officers" was held at Cardiff, on the 26th November, 1872, at which I was asked to take the Chair. After discussing the subject "of the appointment of Officers of Health to Union Districts," and hearing the full explanation which Mr Doyle, Her Majesty's Inspector, was so good as to give, it was unanimously agreed, upon the proposition of Dr. Sheen: that "the temporary appointment of Officer of Health should be "accepted by the Union Medical Officer of each District."

When this resolution had been passed, I ventured to offer to epitomize a paper I had very recently read to members of the British Medical Association "on the work of a Health Officer," and to send a copy of the abstract to each Union Medical Officer in South Wales and Monmouthshire.

In accordance with the promise then made, I have drawn up the following very brief heads of the work to be done, and have the honour to lay a copy thereof before you, in the hope that the outlines may at least point out the way, in which the work may be set about.

1. The first duty of the Officer of Health will be to draw out a plan by which the Inspector of Nuisances, acting under his

directions, may ascertain for him the actual state of the District under the following heads of enquiry. The name of the street, lane, or court. The number of each house, names of owner and of occupier, number of family, of lodgers, and of bedrooms: How the ventilation of the House is secured; by back doors or windows whose upper sashes can be let down? Is there a privy or water-closet: if so in what state is it? Whence is the water used for drinking obtained? Is the source near any cesspool? What is the state of the back premises? Are there any animals kept there? and how is the surface drainage carried off therefrom?—The enquiry should be made from house to house, and entered in a Book, provided for the purpose, at the time of Inspection.

The replies to the above questions would be "yes," or "no," or the number, and so on. The Books would be ruled, and the headings printed: this would be done at the cost of the Authority.

In Town Districts an active man may examine and report on one hundred houses in a day, in rural districts probably 50 or 60 Houses would be as many as he could see. In Merthyr five shillings a day was the payment made for the service.

2. While the Inspector of Nuisances is obtaining the above information, the Health Officer should enquire into, and note the Geological formation of the District, the sources of rivers, height of locality and of the ranges of hills above the sea level. Examine in detail and describe the various isolated Inhabited Buildings, and groups of Houses, observe and trace the old land-marks of the Districts, and the Divisions into Hamlets, and notice the boundary lines of Districts, Parishes or Counties.

3. The numbers of the people will be learned by applying to the Superintendent Registrar, who will supply copies of the particulars of the Census of 1871:—i.e. numbers of Houses, of separate families,

of males, of females, and the totals in each *Enumeration District*, in each Hamlet and Parish—the boundary of each such Enumeration District should be ascertained.—By comparing the details thus obtained, with those which the Inspector's report will give, a check will be afforded upon the accuracy of his enquiries.

4. The watershed and drainage of the district may be learned by personal observation, and by enquiry from the Surveyor of the District; particular notice should be taken of the places where sewers or drains, or the overflow from cesspools, or manure heaps discharge their polluting stuff into rivulets, brooks, &c. Copies of any maps of the district, and tracings of the courses of sewers and drains should be sought for from the Parish authorities. The returns obtained by the Inspector will enable the Health Officer to have a knowledge of the localities of cesspools, &c—and he will carefully bear these in mind, when enquiring into the water supply, and when noticing the deaths from Enteric Fever, Diarrhœa, &c.

5. The Water supply will next need most careful personal enquiry. The relative position of cesspool or manure heap to the well or spout; the presence or not of organic matter in solution; the quantity of the supply, and whether sufficient at all seasons. If insufficient or impure whence a better and greater supply could be obtained? PARKE's Practical Hygiène, BOWMAN's Practical Chemistry, and WANKLYN on Water Analysis, are authorities to be consulted. DANCHELL's Testing apparatus for discovering the presence of impurities in Water, is a most convenient and portable one. It may be had from the London and General Water Purifying Company, 157, Strand, London, W.C., for One Guinea.

6. These preliminary enquiries having been made, the Health Officer should ascertain the numbers of Marriages, Births and

Deaths in the District, and work out the proportionate rates according to the ascertained population. He should obtain the 33rd Annual Report of the Registrar General, (that for the year 1870) and the 93rd, 94th, 95th, and 96th Quarterly Returns of the same official for 1872. Upon turning to the Indexes he will find the name and number of the Union in which his district is situated, and upon referring to the number indicated, the information he desires; the perusal of the particular details given under each head, and of the general statistics given in the report will enable him to work out the various details appertaining to the people in his own district. Further to enable him to arrive at these special conclusions, he must obtain from the district registrar returns of the Births and Deaths; and from the Superintendent Registrar returns of the numbers married. The Rural Sanitary Authority would obtain permission from the Registrar General that these returns may be given; the same authority supplying blank forms, and paying the District Registrar for them. The payment made to the Registrars in Merthyr is at the rate of twelve shillings for each hundred of deaths the registered particulars of which are given.

7. Having obtained the returns of Deaths, the Health Officer will prepare "a tabular statement of the mortality within the district, classified according to diseases, ages, and localities," (I quote here the order of the Local Government Board); in doing this, he may follow the plan as adopted by the Registrar General in his Reports, or may adopt that published by the Royal College of Physicians, in their Book entitled, "Nomenclature of Diseases." A careful study of these tabulated results, and comparison of them with the returns of the inspector, will often reveal to the medical officer the causes of many preventible Diseases. Whenever any such removable cause of disease is discovered it will be the duty of

the Health Officer to *suggest* to the authority the best means for its removal.

8. Whatever nuisance prejudicial to health may be discovered by the Inspector should be reported by him to the Health Officer, who will give directions for the abatement or removal thereof. If the removal or abatement should not have been effected, after due notice, *served by* and *in the name of the Inspector*, then the *latter* should formally report such unremoved nuisance to the authority.

It will be perceived by a study of the foregoing sketch that the work to be done is such that a medical gentleman may fairly apply himself to, with the certainty that the necessary facts can, with a fair amount of energy, be collected, arranged, and clearly set out for the information of the Rural Sanitary Board in a comparatively short space of time.

I have assumed that what I have drafted out, is to be simply a form for a *preliminary* report on the *present sanitary condition of the District;* this preliminary report once written, would however form the basis for future *annual reports.*

I have asked my printers to state the prices at which they would supply copies of the forms I use, and of the Books I recommend for guidance and reference.

If I can in any way be of use to you by giving you any more information upon matters of detail, I shall be only too glad to do so.

I am, Dear Sir,
Yours faithfully,
T. J. DYKE.

Messrs. Farrant & Frost, Booksellers and Printers, Merthyr-Tydfil, will be happy to supply copies of the Forms used, and the Books recommended by Mr. Dyke, at the prices as under, on receipt of a draft or Post Office Order, and parcels of the value of £3 and upwards will be sent, carriage paid, to any part of England and Wales: they can also be obtained, through any Bookseller, of Messrs. Simpkin, Marshall & Co., London.

1. House to House Inspection Book (*as paragraph* 1) *per Book for* 1000 *Houses* - - - - - - - - - - - - - 5s.
2. Forms of Weekly Returns of Births and Deaths. *per* 100 - 7s. 6d.
3. Week Book: for entering the Deaths in each Division of a District, &c., - - - - - - - - - 3s. 6d.
4. Year Book: for entering the Births, Vaccinations, Marriages, and Deaths, in each week in each quarter, and the Deaths, or Sicknesses, from each cause of Disease in each Division, and at the several ages, - - - - - - - 8s.
5. Quarto Writing Paper, cross-ruled for working out figures, 1s. *per quire, or five quires for* 4s. 6d.
6. Quarto Writing Paper, cross-ruled, and with printed heading for tabulating Causes of Deaths at different ages in each year, *per quire* - - - - - - - - - - - - - - 2s.
7. Hassall's "Adulterations Detected" - - - - 17s. 6d.
8. Parke's "Practical Hygiène" - - - - - - - - 16s.
9. Bowman's "Practical Chemistry" - - - - - - - 6s. 6d.
10. Wanklyn on "Water Analysis" - - - - - - - - 5s.
11. 33rd Annual Report of Registrar General for 1870 - 3s.
12. 93, 94, 95, and 96 Quarterly Returns of Registrar General. 8½d. each.
13. Dyke's Seventh Annual Report, Merthyr-Tydfil, 1871 1s.
14. „ "Work of a Medical Officer of Health - - - 6d.

SEVENTH ANNUAL REPORT

ON THE

SANITARY CONDITION

OF

MERTHYR-TYDFIL,

BEING THAT FOR THE YEAR 1871,

WITH APPENDIX ETC.,

PREPARED FOR THE LOCAL BOARD OF HEALTH BY THEIR

MEDICAL OFFICER,

THOMAS JONES DYKE,

FELLOW OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND; MEMBER OF THE BRITISH MEDICAL ASSOCIATION, OF THE ASSOCIATION OF OFFICERS OF HEALTH, OF THE EPIDEMIOLOGICAL SOCIETY, ETC., ETC.

MERTHYR-TYDFIL:
FARRANT AND FROST,
HIGH-STREET.

1872.

SEVENTH REPORT

ON THE

Sanitary Condition of Merthyr-Tydfil.

1871.

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Duties of Medical Officer as approved by the Merthyr-Tydfil Local Board of Health, the 4th January, 1866.

1.—To ascertain what local causes prejudicially affect the Public Health in this District, to inform the Board of those discovered causes, and to suggest such means for their removal as Medical Science can advise.

2.—To seek information of the occurrence of cases of epidemic, endemic, or contagious diseases, and when informed to visit the localities, ascertain the extent of the malady, the local causes likely to conduce to the diffusion thereof, and give such warning as may induce the persons affected to have recourse to medical treatment. In case of an outbreak of Small Pox, to enquire into the history thereof, and as to the practice of vaccination in the neighbourhood.

3.—To inspect any meat exposed for sale for human food, whenever required so to do by an Officer of this Board, or any Police Officer, and to give his opinion as to the fitness or otherwise of such meat being used for human food, whenever required by a Justice of the Peace.

4.—Upon any complaint received by him of the emission of any noxious or offensive smell from any process of trade carried on in any manufactory, yard, house, or premises, or of atmospheric pollution from any drains or sewers, to enquire into the causes, and report upon the means for the prevention thereof.

5.—To perform any duties imposed by any Act of Parliament on the Officer of Health, or Sanitary Inspector.

6.—To attend the Meetings of the Local Board when necessary.

7.—To Report Quarterly the nature and amount of sickness and death, the number of births, and of persons vaccinated; and to present Annually a report and tabular return of the ascertained sickness and mortality of the District.

*MERTHYR-TYDFIL UNION CENSUS, 1871.

PARISHES.	Separate Families	HOUSES. Inhabited.	Uninhabited.	Building.	PERSONS. Males.	Females.	Total.	Per centage of Persons to each inhabited house.
Aberdare	7322	6793	229	55	20175	17529	37704	5 11-20ths
Gellygaer ...	1763	1632	28	23	5016	4176	9192	5 2-3rds
Merthyr-Tydfil	10644	10220	569	9	26979	24912	51891	5 1-13th
Penderyn ...	387	347	98	1	829	839	1668	4 4-5ths
Rhigos	193	170	26	2	443	420	863	5 1-10th
Vaynor ...	647	645	36	4	1389	1403	2792	4 1-3rd
Total	20956	19807	986	94	54831	49279	104110	5 1-4th
ABERDARE WARDS.								
No. 1 North	1874	1679	114	20	4530	4093	8623	5 1-3rd
No. 2 Upper Tn	1801	1634	41	29	5216	4548	9764	5 ½
No. 3 Lower Tn	1769	1676	38	1	4886	4326	9212	5 ½
No. 4 South ...	1878	1804	36	5	5543	4562	10105	5 2-3rds
Total	7322	6793	229	55	20175	17529	37704	5 ½
MERTHYR WARDS.								
Dowlais ..	2424	2374	31	2	7070	5797	12867	5 2-5ths
Penydarran ..	2295	2161	70	3	5694	5230	10924	5
Cyfarthfa .	2040	1968	173	2	4790	4636	9426	4 3-4ths
Town	2515	2405	191	1	5980	6071	12051	5
Plymouth	1370	1312	104	1	3445	3178	6623	5
Total ...	10644	10220	569	9	26979	24912	51891	5 1-13th

PARLIAMENTARY BOROUGH OF MERTHYR-TYDFIL

As Extended in 1868.

PARISHES.	Separate Families	HOUSES. Inhabited.	Uninhabited.	Building	PERSONS. Males.	Females.	Total.
Aberdare	..	6793	229	55	20175	17529	37704
Merthyr .....(Part of)	..	10074	531	8	26569	24566	51135
Vaynor (Brecon).....ditto..	..	541	34	3	1129	1129	2258
Llanwonno ..... ditto..	..	1050	34	0	3087	2707	5794
Total	18363	18458	828	66	50960	45931	96891
ECCLESIASTICAL DISTRICTS—*Aberdare Parish.*							
St. Fagan's ...	...	372	10	19	1025	947	1972
St. Margaret's	...	300	4	0	933	729	1662
Aberdare	..	6121	215	36	18217	15853	34070
Total	...	6793	229	55	20175	17529	37704
ECCLESIASTICAL DISTRICTS—*Merthyr Parish.*							
Dowlais	3199	3111	49	5	9157	7602	16759
Cyfarthfa	1825	1773	109	1	4322	4154	8476
Pentrebach	1570	1497	115	2	3947	3644	7591
Merthyr	4050	3839	246	1	9553	9512	19065
Total	10644	10220	569	9	26979	24912	51891

* From Half-Yearly Abstract, &c.

SEVENTH ANNUAL REPORT

ON THE

SANITARY CONDITION OF MERTHYR-TYDFIL,

BEING THAT FOR THE YEAR 1871.

MERTHYR-TYDFIL, OCTOBER, 1872.

GENTLEMEN,

In presenting to you the following account of the sanitary state of the District under your charge during the year 1871, I have to express my regret that the publication has been delayed to so late a period. The cause of this delay has been, as you must fully know, the excessive additional labour which was imposed upon me by the epidemic of small-pox, which prevailed in the parish from November, 1871 to September, 1872.

CHAPTER I.—*Population, Marriages, Births, Vaccinations, Deaths, and Burials in* 1871.

1.—The Census taken on the 3rd April, 1871, showed the inhabitants of the Parish, on that day, numbered 51,891, and that they occupied 10,220 Houses. In my report to you for the last quarter of 1871, I estimated the population in the middle of that year, at

52,000. I propose to take this number of the people, and the above total of the Houses, as the basis of my calculations of rates of Births, Deaths, &c , &c. for the year.

During the year you caused the Parish to be divided into Wards for the election of representative members of the Board. These divisions were made with the primary object of so dividing the whole parish, as that in each ward some approach should be made to an equal division of the numbers of the people resident therein; necessarily therefore, those natural divisions of the surface, which led to the erection of groups of houses in different parts of the District, were ignored; and parts of the parish, widely dissimilar in aspect, localization, and topographical formation, have been grouped together for municipal purposes.

It is I hold, a primary duty for a Health officer, to regard in the divisions and sub-divisions he may make of his District, the grouping together masses of occupied Houses, which are alike in aspect, site and soil, such Divisions I described in my second annual Report (1866), and I propose to adhere to those Divisions as presenting more resemblances in a sanitary point of view, rather than have recourse to the artificial separation formed for the purposes of the municipal acts.

I shall therefore still speak of the Sub-Registration District of Upper Merthyr, (not including Vaynor) with the Divisions of Dowlais, Penydarren, and Tydfil's Well; and of Lower Merthyr with the Divisions of Merthyr, Gellydeg, and Troedyrhiw.

As the Union Workhouse is situated in the Merthyr Division, the mortality of Parishioners dying at that institution will be distributed among the other divisions in proportion to population.

District and Divisional Population on 30th June 1871.

1. Upper Merthyr Registration District, without Vaynor.		
Division A. Dowlais	16,249	
„ B. Penydarren	4,708	
„ C. Tydfil's Well	5,283	
		=26,240
2. Lower Merthyr Registration District.		
Division D. Merthyr	13,840	
„ E. Gellydeg	5,287	
„ F. Troedyrhiw	6,633	
		=25,760
Total Population of Parish on 30th June, 1871.		52,000

2.—*Marriages.* 456 Marriages were registered before the District Registrars, while 82 were recorded in the Parish and District Churches: giving a total of 538. This number is by 1·43 less than in the previous year, and less than the average of the preceding five years. The rate of Marriages would be 20.7, thus exceeding the average for all England, during the year, which was 16·7, per 1000.

3.—*Births.* The numbers of male children born during the year was 1102, and of females 1041, making a total of 2143. The Birth-rate in the year would be 41·2 per 1000; the rate of Births for all England being 35; the rate was higher in Merthyr by 6·2. It was also higher by 2·4 than the average of the five previous years.

Of the whole number of Births, 100 were of children born out of wedlock; the proportion per cent. would be 4·6. The average

in the year 1869, was for all England 5·8; and for South Wales 8·1. The per centages are largely in favour of Merthyr, and are probably due to the more frequent marriages which take place when wages are high.

4.—*Vaccinations.* The returns obtained from the Public Vaccinators show that 2619 children, under one year old, and 981 over one year, giving a total of 3600, were vaccinated by them in the year. This number is double the average; the excess is accounted for by the desire of the public to avail themselves of the protective influence of Cowpock against the Small-pox, of whose dreaded advent they were informed by you, early in the last quarter of 1871.

5.—*Deaths.* The number of the Deaths registered was 1258; of these 16 were parishioners of other parishes in the Union, whose decease occurred at the Workhouse; thus leaving 1242, as the mortality to be charged to the Parish of Merthyr.

Upon the population as estimated, 52,000, the average per 1000 would be 23·8. The mean rate of Deaths during the previous five years was 24·5, while the average of the chief Towns in England in 1871, was 25. The mortality was therefore less by 0·7, than our former rate; and less by 1·2, than the mean rate throughout the chief centres of Population in England.

6.—*Deaths in each Registration District.* Following the plan I have hitherto adopted, I have ascertained the mortality which took place in each of the Divisions into which I have divided the Registration Districts. After, in each case adding a due proportion of the number of Deaths of Parishioners (74) which occurred at the Union Workhouse, I find

that in the Upper Merthyr Registration District, with a population of 26,240, the death-rate was 25 per 1000, while in the Lower Merthyr District, with a population of 25,760, the death rate was 22·7. Following the figures into the Divisions of each District, I learn that in Penydarran the proportionate annual mortality was 26·1; in Dowlais, 25·1; in Tydfil's Well, 23·8; in Troedyrhiw, 23·6; Gellydeg, 21·1; and in Merthyr, 19·0.

That Penydarran and Dowlais should still form the dark shadings on your sanitary map is much to be regretted, especially as a careful study of the causes of the larger mortality there, reveals the fact that the excess is preventible. The Diseases whose greater prevalence have occasioned the increase, are those which have their origin in damp houses, and the exhalations from excrementitious deposits. The resumption of the drainage of the houses, and their connection with the admirably acting system of sewers, will tend to remove both causes, and I may confidently assure you, that when these promoting causes of disease shall have been thoroughly done away with, the dark lines on your sanitary map will be greatly lessened.

With regard to Troedyrhiw, it should be remarked, that the extensive coal workings of the Cyfarthfa and Plymouth Iron Works are situated within the Division, and that the average mortality is greatly increased by the deaths from accidents which have happened to the workmen employed at the Collieries.

7.—*Causes of Death.* The Table, demonstrating these causes of Death, prepared in accordance with the seventh Paragraph of your minute defining the medical officer's duties, is appended hereto. A more condensed view of the number of Deaths attributed to each class and order of causes being desirable, I place before you an abstract of the mortality during the year;—

ABSTRACT OF MORTALITY IN MERTHYR-TYDFIL.

1871.

Classes of Diseases.	Under 5 Years		Above 5 Years.		Deaths in each Order.			Totals in each Class.
	M.	F.	M.	F.	M.	F.	TOTALS	
CLASS 1. GENERAL DISEASES.								
Order 1. Contagious, Epidemic, &c.	57	71	28	23	= 85	94	179	
2. Constitutional	61	37	104	90	= 165	127	292	
								= 471
CLASS 2. LOCAL DISEASES.								
Order 1. Nervous System	58	46	36	24	= 94	71	164	
2. Circulatory „	1	1	28	31	= 29	32	61	
3. Ductless Glands	0	0	0	1	= 0	1	1	
4. Respiratory system	50	41	74	28	= 124	68	193	
5. Digestive „	19	18	27	13	= 46	31	77	
6. Urinary „	2	1	17	9	= 19	10	29	
7. Uterine „	0	0	0	18	= 0	18	18	
8. Locomotory „	0	0	3	0	= 3	3	3	
9. Cutaneous „	0	0	4	0	= 4	0	4	
								= 550
CLASS 3. DEVELOPTMENTAL.								
Order 1. Debility of Age	0	0	28	45	= 28	45	73	
2. „ of Infancy	33	32	0	0	= 33	32	67	
								= 140
CLASS 4. VIOLENT DEATHS.	8	10	61	9	= 69	19	88	
								= 88
Not Specified, &c.	2	2	2	3	= 4	5	9	
								= 9
	293	259	412	294	= 705	553		
	552		706					= 1258

Population.....under 5 years 8000; above.....44,000 250,00

Proportionate mortality per 1000 „ 69; „ 16

Population.....male 27,054; female .....24,946 =52,000

Proportionate mortality per 1000 „ 26; „ ..... 22·16

8.—*Deaths from Contagious Diseases.* I would first call your attention to the great diminution in the number of Deaths from Contagious Maladies prevailing as Epidemics, by remarking that the mortality due to these ailings was less by one-third in 1871 than it had been in 1870. But remembering that these maladies appear in almost regular course, and that after having passed as a wave over the whole of a neighbourhood, they are comparatively infrequent for some time afterwards, it would be wrong to take credit for any definite improvement in the public health on this account, since the lessened death-rate may in part be accounted for by the comparative absence of these lethal maladies. The need of bearing these remarks in mind will be the more pertinent, as in the November of this year the first indications of the coming wave of Small-pox were noticed. Of its advent, progress, and conclusion a full account will be given in the Report for 1872. It will suffice here to say that nine deaths were recorded as being occasioned by Small-pox, between the 9th of November, when the first fatal case occurred, and the end of the year. The deaths from Typhus Fever were exceptionally few: only 12 fatal issues are recorded. The persons afflicted by this contagious malady resided in houses either imperfectly ventilated, or occupied by many persons, members of one family, the houses themselves being small, badly ventilated, and filthy, and in almost all cases the drunkenness of the parents was the patent cause of all the evils. Relapsing Fever was happily conspicuous by its absence. Enteric Fever claimed but twelve victims. The small number of Deaths attributed to this disease is a subject of just congratulation on your part. This malady, the offspring of excrementitious filth spread about unventilated dwellings, year by year laid down on the bed of tedious and lengthened sickness many hundreds of our poorer brethren, yet happily year by year, as the broom of the scavenger, and the mattock and spade of the labourer have cleared off putri-

fying filth from the surface, and cut deep drains to carry off the moisture from foundations, so year by year the number of persons afflicted by this preventible disease has been diminished, and the death roll therefrom lessened. It is only in the districts which have not been drained, and in houses in which the drains run from the backs, under the stone floors, to the front gutters, that the malady now appears. The means of prevention are so patent, so easy to do, and so all-powerful in their action, that I will hope that ere many seasons shall have passed away, your Officer of Health may be able to present you with a Bill of Health "clean" of Enteric Fever.

9.—*Constitutional maladies of the Scrofulous Type* have not markedly diminished, the numbers being 211. Possibly the continuous wetness of the weather throughout the year, while conducing directly to the dampness of the ground-floors of stone built and stone paved houses (that prolific source of the scrofulous degeneration in the human race) may have tended to keep up the average of deaths attributed to these maladies. Time and advancing drainage are needed to remove this cause, and when the consequent drying of the sub-soil shall have had a due period of time to exert its powerfully healing influence, I hope that the ratio of mortality may be greatly lessened.

10.—*Local Diseases.* Among the ailings grouped under the head of Diseases of the Nervous System, Infantile Convulsions claim by far the largest number of deaths. In 1871 the proportion due to this disease is lessened by one-third as compared with the number set down to it in 1870. The cause of this diminution would probably be found in the absence of wide spread contagious maladies, for it frequently happens that children infected by any one of the diseases of this character are attacked at

the onset by convulsions, and fall victims to this nervous affection before the characteristic symptoms of Scarlet Fever, Measles, or Whooping Cough appear.

11.—*Diarrhœa.* As to the remaining maladies in the long list of Causes of Death, no especial remark is called for, the proportionate rate of mortality not being greater than the average, and the ailings themselves not being preventible by means such as those which the Legislature has entrusted to your working. But attention should be drawn to one most remarkable and creditable diminution in the numbers that have succumbed to one Disease—I allude to Diarrhœa—the number of deaths set down to this disease of the Digestive System being 9 for those under 5 years of age, and 3 for those over 5 At the latter age, the death would probably have been caused by chronic disease of the intestines; but those which occur at ages under 5 years are generally to be attributed to the drinking of polluted water, or to the inhalation of air loaded with the exhalations from decomposing excrement. In the long list of annual Death-rates from Diarrhœa in 1870, in 50 large towns in England and Wales, the mean was 4·4 per 1000, in that year the rate in Merthyr was but 0·9: in 1871, in the 50 large towns it was 3·7, in Merthyr in the same year, 0·6!

The purity of the water supplied to the Inhabitants, *unpolluted as it is by any possible contact with sewage*, is I believe the cause of this happy immunity from the ravages of this fatal destructive of human life.

12.—*Ages at Death.* The totals at the bottom of the table in the Appendix show that 552 of the whole number who died in 1871 were at their decease under 5 years old. The proportion per thousand of the Deaths would be 439. These

figures indicate a return to our former favourable averages. The number of persons who at death were over 5 years is stated at 706, and of those who had passed their 70th year of life the number is 113. The proportion which these latter bear to the 1000 deaths is 90; this also is a far more favourable return than the one I had to lay before you in 1870.

13.—*Average Age at Death.* Summing up the whole of the periods of time lived by the 1,258 persons who died in 1871, and dividing the sum by that number, the mean average age at Death was ascertained to be 25½ years. In 1870, the average was reduced to 22⅛ years, from the previous high rate of 26 years. Upon the six years, 1866 to 1871, the average would be 25½—a happy extension of the *privilege of existing* from that which prevailed in Merthyr before the introduction and vigilant application of the Public Health Act in 1850, when the mean length of life was but 17½ years.

CHAPTER 2.—*Price of Iron, Rate of Wages, Prices of Food, Pauperism, and the Weather in* 1871.

14.—*Price of Iron.* The average of the Weekly Quotations throughout the year of the price of Bar Iron in the *Engineer* newspaper, was £7 11s. per ton. The prices according to the same authority in 1870 were £7 4s.; in 1869, £6 4s.; in 1868, £5 15s; in 1867, £5 17s. 6d.; and in 1866, £6 4s. 6d. The price of Rails varied from £6 2s. 6d. to £7 10s.

15.—*Rate of Wages.* I have been favoured with an account of the average weekly wages paid at one of our chief Iron Works during the year 1871, from which I have calculated as follows: to Colliers, 25s.; Ironstone Miners, 22s. 6d.; Furnace men, 24s.; Puddlers, 29s.; Ballers, 31s.; Rail Rollers, 60s. These last are skilled workmen, paid by the ton, and employed at a labour at which comparatively few can work.

16.—*Prices of Food.* Bread in 1871 was dearer than in 1870, the price for best seconds averaging 43s. 3d. as against 38s. 10½d. in that year: but it was lower by 11d. than the mean 44s. 2d. of the four previous years. The prices of Beef and Mutton were the same as in 1870, 6½ per pound. Best Salt Butter was 1s. 2d. a pound, and Potatoes 4s. 2d. a hundred weight.

17.—*Pauperism.* The mean numbers of the paupers relieved in 1871 was 3332, the average of the five preceding years being 3095. The vagrants to whom temporary relief was given were 399, the numbers relieved in 1870 were 605, and in the three preceding years they averaged 3034. You will remember that this diminution was consequent upon the more stringent rules adopted by the Board of Guardians.

18.—*The Weather in* 1871. 1st Quarter. A bright clear morning with a brisk wind from the East ushered in the first day of the year, but ere night had fallen, the mercury in the Barometer had sunk, the wind veered to the west, and a heavy snow fall occurred. Alternating winds now east now west for many days vexed mankind, now with cold now with wet:—as was the character of these first days of the year, so on the whole was the weather throughout the year. On the 14th of January, a steady, rapid and continuous fall of the Barometer indicated a change: on the morning of that day the reading was 29.70, at 9 at night, 29.50: on the morning of the 15th, 29.10, when heavy showers came on in scuds; in the evening a great gale from the west blew, the hills being covered with snow, the Barometer read 29·10, the Thermometer, 36°, and one inch of Rain had fallen On the morning of the 16th a strong wind blew from the west, the Barometer reached its lowest, 28.6, the Thermometer 33°. Heavy Rain fell in the evening, the

Barometer rising to 28.65. From henceforth the mercury continued gradually to rise, but it was not until the 23rd that it had risen to the same reading as on the 14th. Frosty weather, and strong easterly winds prevailed to the end of the month. The Rainfall was 4.44 inches in 15 days, the mean temperature of the month 32.5. In February, there was rain on 19 days to a depth of 4.82 inches, the mean temperature 40° being exceptionally high. In the early part of March the same unfavourable wet weather continued, on the 14th the wind veered to the north and east, and for the remainder of the month the weather was fine, and the sky clear. The Rainfall on 12 days being 2.81, and the mean temperature 42.°

The mean Temperature of the Quarter was 38.5° and the Rainfall on 46 days, 12.08 inches.

2nd Quarter. The month of April was one of showers, though during some part of each day the sun shone bright and clear, a rise in the temperature followed, the mean being 43°, while the number of rainy days was 16, and the Rainfall 5.28 inches. In May a succession of bright clear days was given to us, the wind blowing from the east or north-east. The Rainfall, on 4 days only, was very slight, 0.63 inches: the mean temperature 49°. This favourable weather did not long continue, for during June the sky was generally over cast, and rain fell on 16 days: the quantity (2.30) being small. Much thunder was heard on the 10th, 11th and 17th. The mean temperature was raised to 52.°

The mean temperature of the Quarter was 48,° and the whole rainfall, 8.21 inches on 36 days.

3rd Quarter.—*July*, usually the summer month, was cold, 55° the average, and very wet, 23 days of rain with a fall of 5·64 inches. In the first autumn month, *August*, the weather was generally fine, the rainfall being small 3·41 inches on 8 days. The

mean temperature 59° In *September* rain fell on 14 days (6·28 inches). but as the mid-days and evenings were fine, the mean temperature, 54°, was not very greatly diminished

In the Quarter the Rainfall amounted to 15·33 inches on 45 days, while the average temperature was 56°.

4th Quarter.– In *October* the same wet weather continued, rain fell on 20 days to a depth of 6.60 inches; the mean temperature being lessened to 46°. *November* was exceptionally characterized by fine dry weather during 21 days, rain fell on 9 days and then to a depth of only one inch. The temperature was 435°. In *December* it rained on 15 days, 4·23 inches of water being collected. The mean temperature was 36°.

The Rainfall of the Quarter was 11·83 inches on 44 days, and the mean temperature 39°.

19.—*Rainfall of the Year.* During the whole year the Rainfall amounted to 47·45 inches, on 171 days. The following table will show the rainfall during the years numbered.

Years.	Rainfall in Inches.	Days on which it rained.
1871	47·45	171
1870	48·73	130
1869	60·57	163
1868	61·59	159
1867	51.78	164
1866	58·39	204
Mean	54·75	148½

CHAPTER 3.—*Water Supply, Sanitary Improvements, Inspection of Lodging Houses, Markets, and Workshops.*

20.—*Water Supply.* The purity of the water has been duly ascertained at various times during the year. The mean degree of hardness was three: indicating the presence of as many grains of lime in each gallon. No other inorganic matter was contained in it, and its perfect transparency after the addition of the "Nessler" test proved it to be entirely free from ammonia, and therefore from any polluting organic matter. The number of Houses supplied from the public mains was 10,167: the gross revenue from water rents £4284 15s. 11d., and from the sale of water used for machinery, &c., £1109 5s. 3d.—a total of £5394 1s. 2d.

21.—*Sanitary Improvements.* This year again the same all-powerful preventive—the Injunction from the Court of Chancery—rendered nugatory every effort permanently to remove the many nuisances, injurious to the health of hundreds of the people, which were in existence in all parts of the town, the work of your Surveyor was therefore limited to abating, as far as the means at his command enabled him, the causes which induced diseases. Happily, however, he was also engaged in carrying into execution his scheme (to which the sanction of Parliament had been obtained in 1870) for the ultimate disposal of the Sewage of the town by irrigation, and in laying out the tentative method of purifying sewage by Downward Intermittent Filtration, suggested by DR. EDWARD FRANKLAND, and devised by MR. J. BAILEY DENTON.

22.—*Common Lodging Houses, Houses let in Lodgings, and the Markets* were diligently and regularly inspected by the appointed officers: the good results of their labours are to my mind made distinctly apparent in the general absence of cases of Contagious diseases, in the classes of houses under their supervision.

23.—*Inspection of Workshops.* This duty I performed during the early and middle parts of the year. Happily in August, 1871, an act was passed by Parliament transferring the duties of inspection to the Sub-Inspector of Factories, and at the end of that month, I was, to my great comfort, relieved from a most irksome labour.

SUMMARY.

To the many thousands in Merthyr whose daily bread is earned by hard toil in piercing the Ironstone rock, in cutting the "black diamond," or in fusing the precious metal obtained from the former by the fervent aid of the latter, a rate of wages, which would be adequate to the purchase of a sufficient quantity of nutritious food, is a matter of the very first necessity. That such an adequate rate of wage was weekly earned will be apparent upon carefully considering the figures in section 15, on page 10. A certain stability of health, due to the daily use of a sufficiency of nourishing food, enabled our working men and their families to endure the frequent and long continued periods of wet and cold weather, which prevailed throughout the year, without any marked increase in the numbers of the sick. That this was so is demonstrated by the absence of any excess in the deaths from maladies affecting the respiratory organs, and notably by the very few deaths from diarrhœa, a disease which, when provisions are dear, labour ill paid, and the weather wet and cold, counts its victims by scores.

The total of deaths attributed to accidents in the Ironstone and Coal Mines, on Railways, and in the Iron Forges and Mills

were *fifty*. The numbers employed daily in the Parish cannot be less than 20,000 persons. The proportion of fatal accidents per annum would therefore be only a *quarter per cent.* Remembering the imminence of the danger constantly attendant upon underground labour—the sudden fall of the unsupported roof, the explosions of blasting powder, or of the terror-spreading fire-damp, the myriad perils which surround the lads, lithe of limb and careless of danger, and the older workmen, incautious by familiarity, who labour amidst the whirling machinery of the mills, remembering these and other perils which surround our "wocking bees," it is a subject of congratulation that the labour is attended by so few casualties which prove fatal.

The death-rate for the year was 23·8. In olden times it stood at 36. The mean rate of mortality of children, under five years of age, in all England, with its vast country population, was 67 per 1000 living; in Merthyr, with its vast town population, it was 69. The proportionate mortality of children of this age used to be 52 out of each 100 deaths—it was in 1871, 43. The number of persons who, in the former state of the town, attained their 70th year and upwards before death was 55; in 1871 these numbered 113. The average length of life in 1852 was 17½ years; in 1871 it had been extended to 25½ years.

Standing on the vantage ground on which the efforts of this Board has placed them, who, among our people, is there that, looking back on the past, the dark past, when our streets and lanes were studded with heaps of putrefying refuse, our people dependent upon the dripping "spout" for water, our houses crowded, our sick by hundreds lying in filthy unventilated dens, who is there that will not be thankful to a wise legislature who gave the laws, a wise people who commanded that they should be used, and a noble-hearted band of men, recruited year by year

from the ratepaying ranks, who have devoted their time and their talent to the promotion, and happily to the realization, of results so beneficent as those which I just enumerated?

The life of little children made less subject to malignant diseases, that of those in "the sere and yellow leaf" of age less saddened by the untimely loss of their manly sons, their own lives prolonged far beyond the allotted term of man: these various results due to your successful efforts to obtain for your fellow-townsmen a healthy home, pure water, and unpolluted air call for their warmest thanks, and among those who note and appreciate these blessings, there is no one who more earnestly acknowledges your devotion than

Your faithful Servant,
T. J. DYKE,
Medical Officer of Health.

To the Chairman and Members
Of the Local Board of Health,
Merthyr-Tydfil.

CAUSES OF AND AGES AT DEATH IN MERTHYR TYDFIL IN 1877

315 Pneumonia .. .	21	8	5	5	1	19	21	4	1	3	7	5	6	5	2	6	0	21	11	73		
	46	24	14	6	1	50	41	9	1	3	10	16	17	30	14	2	0	74	28		—	193
Order 5—Digestive System																						
350 Thrush	6	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	6		
365 Dentition	8	8	0	0	0	10	6	0	0	0	0	0	0	0	0	0	0	0	0	16		
423 Tonsillitis .. .	0	2	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	1	3		
449 Gastritis	0	0	0	0	0	0	0	0	0	1	0	1	2	1	0	0	0	5	0	5		
464 Enteritis	2	0	0	0	0	1	1	0	0	1	0	1	1	0	0	0	0	2	1	5		
of Mercury suicide	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1		
992 Burns and Scalds ..	0	2	1	2	1	2	4	1	1	0	2	0	1	1	0	0	0	2	4	12		
994 Multiple Injuries ..	1	1	1	0	1	3	1	0	29	5	10	6	7	5	1	1	0	52	3	59		
994 Asphyxia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
A. Drowning : accident	0	1	1	2	2	2	4	1	0	0	0	0	4	0	0	0	0	5	0	11		
B. Drowning : suicide	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	1	2		
C. Overlying	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2		
D. Carbonic Acid ...	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1		
	3	4	3	4	4	8	10	2	21	6	12	7	13	7	1	1	0	61	9		—	88
Exposure to cold ..	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	1	2		
Not specified	3	0	0	1	0	2	2	0	0	0	0	0	1	2	0	0	0	1	2	7		
	3	0	0	1	0	2	2	0	0	0	0	0	2	2	1	0	0	2	3		—	9
	291	123	66	42	30	293	259	55	66	83	97	100	96	96	70	37	6	412	294			
	Total under 5 years...					552							Total above 5 years ..					706			—	1258

NOTE.—The figures preceding the names of Diseases, refer to the numbers in the "Nomenclature of Diseases," published by the Royal College of Physicians of London.

CAUSES OF, AND AGES AT, DEATH IN MERTHYR-TYDFIL IN 1871,

INCLUDING 90 DEATHS AT THE UNION WORKHOUSE.

DISEASES.	AGES BELOW																Above 5		TOTALS.
	1	2	3	4	5	Below 5 M.	Below 5 F.	10	20	30	40	50	60	70	80	90	100	M.	F.	
Class 1—General Diseases.																				
Order 1—Contagious, Epidemic, &c.																				
1 Small Pox	0	0	1	0	1	2	0	1	1	4	1	0	0	0	0	0	0	2	5	9
4 Measles	8	23	15	9	5	29	31	3	0	0	0	0	0	0	0	0	0	1	2	63
5 Scarlet Fever	6	4	8	4	7	14	15	11	3	0	0	0	0	0	0	0	0	5	9	43
7 Typhus „	0	0	1	0	0	0	1	1	1	0	4	4	1	0	0	0	0	0	2	12
9 Enteric „	1	1	1	1	1	1	4	4	0	1	0	1	1	0	0	0	0	5	2	12
19 Diphtheria	0	2	1	1	1	3	2	0	1	0	0	0	0	0	0	0	0	1	0	6
20 Whooping Cough	9	10	3	4	0	8	18	2	0	0	0	0	0	0	0	0	0	0	2	28
30 Erysipelas	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2	0	0	4	1	5
31 Pyæmia	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1
	24	40	30	19	15	57	71	22	7	5	6	6	2	2	0	1	0	28	23	— 179
Order 2—Constitutional.																				
34 Acute Rheumatism	0	0	0	0	0	0	0	1	2	1	0	4	0	2	1	0	0	8	3	11
43 Syphilis	11	3	0	1	0	12	3	0	1	0	0	1	1	0	0	0	0	2	1	18
44 Cancer	0	0	0	0	0	0	0	1	1	2	7	13	3	0	0	0	0	1s	10	28
49 Scrofula	1	1	2	2	1	4	5	0	3	1	0	0	1	0	0	0	0	3	1	11
„ with Tubercle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A. of the Brain	1	5	1	0	0	4	3	0	0	0	0	0	0	0	0	0	0	0	0	7
B. „ Lungs	0	0	0	0	0	0	0	8	23	40	33	29	13	7	0	0	0	71	72	144
C. „ Mesentery	27	24	8	6	2	40	27	1	0	0	0	0	0	0	0	0	0	1	0	68
52 Diabetes	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
57 General Dropsy	0	1	0	0	1	1	1	0	0	0	0	0	0	1	1	0	0	1	1	4
	49	34	11	9	4	61	37	11	29	43	40	38	18	11	2	0	0	104	90	— 292
Class 2—Local Diseases.																				
Order 1—Nervous System.																				
61 Inflammation of brain	3	4	2	2	1	9	3	3	3	2	2	3	2	0	0	0	0	7	8	27
65 Apoplexy	0	0	0	0	0	0	0	0	0	2	1	0	5	3	3	1	0	11	4	15
70 White Softening	0	0	0	0	0	0	0	1	0	0	0	4	3	1	0	0	0	6	3	9
84 Paralysis	0	0	0	0	0	0	0	0	1	2	0	4	1	3	3	1	0	8	7	15
92 Infantile Convulsions	89	6	4	1	1	49	43	0	0	0	0	0	0	0	0	0	0	0	0	92
93 Epilepsy	0	0	0	0	0	0	0	1	0	1	0	2	2	0	0	0	0	4	2	6
	83	10	6	3	2	58	46	5	4	7	3	13	13	7	6	2	0	36	24	— 164
Order 2—Circulatory System.																				
Heart Disease	1	0	0	0	1	1	1	0	2	2	11	6	9	16	11	0	0	26	31	59
250 Aneurism	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	2	0	2
	1	0	0	0	1	1	1	0	2	2	12	6	9	17	11	0	0	28	31	— 61
Order 3—Diseases of the Ductless Glands																				
286 Addison's Disease	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
																				— 1
Order 4—Respiratory System.																				
288 Croup	3	2	0	0	0	2	3	5	0	0	0	0	0	0	0	0	0	2	3	10
306 Acute Bronchitis	22	14	9	1	0	29	17	0	0	0	2	4	3	9	2	0	0	14	6	66
306 Chronic Bronchitis	0	0	0	0	0	0	0	0	0	0	0	4	6	9	6	1	0	23	3	26
314 Asthma	0	0	0	0	0	0	0	0	0	0	1	3	2	7	4	1	0	14	4	18
315 Pneumonia	21	8	5	5	1	19	21	4	1	3	7	5	6	5	2	0	0	21	11	73
	46	24	14	6	1	50	41	9	1	3	10	16	17	30	14	2	0	74	28	— 193
Order 5—Digestive System.																				
350 Thrush	6	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	6
365 Dentition	8	8	0	0	0	10	6	0	0	0	0	0	0	0	0	0	0	0	0	16
423 Tonsillitis	0	2	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	1	3
449 Gastritis	0	0	0	0	0	0	0	0	0	1	0	1	2	1	0	0	0	5	0	5
464 Enteritis	2	0	0	0	0	1	1	0	0	0	1	1	1	0	0	0	0	2	1	5
478 Intus-susception	2	0	0	0	0	1	1	0	0	0	1	0	0	1	0	1	0	3	0	5
480 Hernia	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1
484 Diarrhœa	6	1	1	0	1	4	5	0	0	0	0	0	2	1	0	0	0	2	1	12
501 Hepatitis	0	0	0	0	0	0	0	0	0	2	2	1	1	1	0	0	0	4	3	7
506 Cirrhosis	0	0	0	0	0	0	0	0	0	0	0	1	1	4	3	2	0	8	2	10
531 Peritonitis	0	0	0	0	0	0	0	1	0	0	1	0	1	3	0	1	0	3	4	7
	24	11	1	0	1	19	18	2	0	5	4	4	12	9	3	1	0	27	13	— 77
Order 6—Urinary System.																				
538 Bright's Disease	0	0	1	0	2	2	1	2	2	1	3	7	5	4	0	0	0	15	9	27
557 Cystitis	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1
580 Prostatic Abscess	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1
	0	0	1	0	2	2	1	3	2	1	3	7	6	4	0	0	0	17	9	— 29
Order 7—Diseases of Women																				
708 Childbirth	0	0	0	0	0	0	0	0	0	2	3	2	0	0	0	0	0	0	7	7
719 Metro-Peritonitis	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	8	8
727 Puerperal Convulsions	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	3	3
	0	0	0	0	0	0	0	0	0	9	7	2	0	0	0	0	0	0	18	— 18
Order 8—Diseases of Organs of Locomotion.																				
784 Caries of Spine	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	3	0	3
																				— 3
Order 9—Diseases of the Cutaneous System																				
864 Carbuncle	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1
866 Gangrene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	0	3
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	1	0	4	0	— 4
Class 4—Developmental.																				
903 Premature Birth	7	0	0	0	0	6	1	0	0	0	0	0	0	0	0	0	0	0	0	7
904 Debility from Age	0	0	0	0	0	0	0	0	0	0	0	0	1	7	32	29	6	28	45	73
905 Debility of Infancy	60	0	0	0	0	29	31	0	0	0	0	0	0	0	0	0	0	0	0	60
	67	0	0	0	0	35	32	0	0	0	0	0	1	7	32	29	6	28	45	— 140
Class 5—Violent Deaths.																				
907 Poison (Red Oxide of Mercury) suicide	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1
992 Burns and Scalds	0	2	1	2	1	2	4	1	1	0	2	0	1	1	0	0	0	2	4	12
994 Multiple Injuries	1	1	1	0	1	3	1	0	2s	5	10	6	7	5	1	1	0	32	3	59
994 Asphyxia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
A. Drowning: accident	0	1	1	2	2	2	4	1	0	0	0	0	4	0	0	0	0	5	0	11
B. Drowning: suicide	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	1	2
C. Overlying	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2
D. Carbonic Acid	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1
	3	4	3	4	4	8	10	2	21	6	12	7	13	7	1	1	0	61	9	— 88
Exposure to cold	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	1	2
Not specified	3	0	0	1	0	2	2	0	0	0	0	0	1	2	0	0	0	1	2	7
	3	0	0	1	0	2	2	0	0	0	0	0	2	2	1	0	0	2	3	— 9
	291	123	68	42	30	293	259	55	66	83	97	100	96	96	70	37	6	412	294	
	Total under 5 years					552									Total above 5 years			706		— 1258

NOTE.—The figures preceding the names of Diseases, refer to the numbers in the "Nomenclature of Diseases," published by the Royal College of Physicians of London.

HOUSEHOLD SCAVENGING.

REPORT TO THE TOWN COUNCIL

OF THE

BOROUGH OF GRIMSBY

(Acting as a Local Board of Health,)

ON THE

COLLECTION & DISPOSAL OF DOMESTIC REFUSE,

BY

JOSEPH MAUGHAN,
BOROUGH SURVEYOR.

GRIMSBY:
PRINTED BY GEO. S. NUTT, CLEETHORPE-ROAD.
1872.

REPORT.

To the Worshipful the Mayor, Aldermen, and Burgesses of the Borough of Grimsby, acting as the Local Board of Health for the said Borough.

Mr. Mayor and Gentlemen,

HOUSEHOLD SCAVENGING.

Supplementary to my observations to you on this subject on the 19th of January last, copy of which is now before you, I beg leave to submit for your consideration the following suggestions with the view to meeting the recommendations set forth in the official medical report of Dr. Home, and complying, as far as may be found practicable at present, with the conditions enunciated in my own report of that date as being essential to a complete system of household scavenging.

In paragraph No. 2 of his recommendations referring to the removal of nightsoil refuse, Dr. Home says:—

"With respect to the arrangements now existing for the removal of nightsoil and the contents of ash-pits, dung-heaps, &c., it is abundantly clear that a reform in this matter is of pressing necessity, and the requirements must be contemplated as those necessary for a rapidly growing town.

"The Local Board must be prepared either to carry out generally the water-closet system of excrement removal, or else adopt and work some well devised other system for the same purpose.

"Whatever system is adopted, its value will greatly depend on the strictness of the supervision exercised in carrying out its details; the work should therefore be done under the direction of the officers and by the servants of the Local Board."

Assuming then that the water-closet system is not likely to obtain general prevalence in Grimsby, and in view of these recommendations of Dr. Home and my own conditions, I have to recommend—

1st. The adoption throughout the town, wherever new privies are contemplated or old ones required to be remodelled or amended, of "The Patent Universal Dry Closet," specimens of which have been by your direction erected within the precincts of the Town-hall, and one of which I put up on my own premises at the same time, and which without any other supervision than that of a female domestic has acted perfectly, largely economising the consumption of coal by the enforced use of the dry ash screen, and in other respects giving unqualified satisfaction.

2nd. That for the disposal of offal and other domestic refuse it should be made compulsory that all premises should be provided with a suitable receptacle for use in common in courts and blocks of tenements belonging one owner, and all of which should be readily accessible so as to be emptied by the dustman during the day and conveyed to the temporary depôt hereinafter described; as should also,

3rd. In separate conveyances be removed that arising from the kitchen sinks and other yard cesspools and the street gullies.

4th. That the removal of the matter of the privy receptacle should take place at least weekly, and in order that the same be conducted without offence it should be effected in properly constructed carts provided by the Local Board, and by men and horses in the employ of the Board, duly organised under strict supervision both by day and night.

5th. That when not put direct into railway trucks or vessels for removal by water, the collected matter should be conveyed to a temporary depôt, *remote* as possible from dwellings to avoid offence,

central so as to economise time during the limited hours of collection, and contiguous to the railway to afford facility for transhipment, and open out opportunity for communication therewith by a siding.

To this depôt all the dry street sweepings should also be conveyed for use in the closets, and the rest for incorporating with the manure for subsequent sale.

A suitable site for such a depôt suggests itself near the new gas holder (at the spot marked in red on the accompanying plan), distant 100 yards and upwards from the nearest dwelling-house, and embracing but very few within double that radius, while almost the entire area of the town, new and old, is comprised within a ¾-mile range, and the whole new, old, and prospective from the Nun's Farm to the Cootes boundary within a radius of 70 chains.

Such a provision would meet the objection raised by Mr. Councillor Dawson as to the vastly disproportionate occupation of time in transit over that of collection, effecting as it would a saving in cartage say from Freeman-street Market to the present depôt, by the existing route, of more than two-thirds of the distance, and by the one available on the opening of the new bridge over the Old Dock of fully one half. From the New Market-place a saving of one-half the distance; and from the Old Market-place of 10 chains.

From the Royal Hotel to the present depôt the distance, now 1¼ mile, would be reduced one-half, about an equal distance to that over the new bridge. The distance from the Humber Hotel to the present depôt is 155 chains, which by the road over the new bridge would be reduced to 98; that to the proposed depôt would be 70 chains. The distances from Pelham-terrace are in both cases equal.

Assuming such a position attainable and otherwise unobjectionable, the labour of collection would be materially reduced, opportunity of supervision and enforcing an adequate return of labour from each collector would be afforded, and facility for removal by farmers' ordinary conveyances or by railway trucks would be promoted, and an ultimate connection with the railway by a siding would be readily practicable—one of the stipulations named by the Manchester Com-

GEO. N. NUTT, "OBSERVER" OFFICE, CLEETHORPE-ROAD, GRIMSBY.

THE

SEWAGE QUESTION,

WITH

REMARKS ON A LITTLE SUSPECTED,
FREQUENT, AND NOT EASILY DETECTED SOURCE
OF TYPHOID AND OTHER ZYMOTICS

By ANDREW FERGUS, M.D.,
F.F.P. & S., G.;
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PRESIDENT OF THE SOCIAL AND SANITARY SECTION OF THE GLASGOW
PHILOSOPHICAL SOCIETY; ETC., ETC.

Reprinted from "Edinburgh Medical Journal," and "Transactions of Social Science Congress."

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PREFACE.

I HAVE to apologise to my readers for presenting them with two papers, in the second of which so much of the first is reproduced.* My reason for giving the Leeds paper entire is to show that the evil effects of sewer gas were well known, and that attempts had been made to draw attention to the subject before the illness of the Prince of Wales. I had done the same at Newcastle the previous year—but on both occasions, engineers and others in favour of sewage irrigation, were in the ascendent, and insisted that when we have tubular drains we have little to fear. As far back as the month of October, 1868, I directed attention to the subject at the Meeting of the Glasgow Medico-Chirurgical Society, but the Profession, with a unanimity rarely exhibited by it, condemned the views brought forward on that occasion.

One speaker remarked that "Dr. Fergus's whole argument virtually resolved into a strenuous denunciation of the modern water closet system." Again, the same speaker says, "It was in places where there were no sewers that they were to look for the noxious gases so much spoken of." The next gentleman

* In reading the Second Paper, pages 7 and 8 may be passed over.

said, "He also believed that the quantity of noxious emanations from the sewers must be very trifling indeed;" also, that "Dr. Fergus was rash in his assertion that these emanations were the cause of gastric and other fevers." A third speaker said, "He would not join with Dr. Fergus in believing that the production of sewer gases was the cause of fever;" and the last speaker, the Medical Officer of Health, said, "With regard to fevers, he (Dr. G.) considered it well established, that enteric fever in certain cases is due to sewer gases, but so far as Glasgow is concerned, this evil was not of any very great amount."—(*Glasgow Medical Journal*, Nov., 1868.) Seeing that the Medical Officer had for more than five years held his office, and was, moreover, chairman of the meeting referred to, and therefore, in a very responsible position when the discussion took place—I was surprised that he should know so little about the evil effects of sewer gas. If it were not too serious a matter it would be amusing to contrast the above opinion of the Medical Officer, with the same gentleman's recent memorandum to the Police Board, (see *Herald* of Jan. 20th), in which he says, "That even the best constructed sewers may become, under circumstances of very frequent occurrence, magazines of offensive and deleterious gases." No one agreed with me when I described modern sewers and cesspools as gigantic laboratories for the production of sewer gas—the Medical Officer now admits they may be so—but uses the word magazines, *i. e.* storehouses. The term "laboratories" seems to me better, as indicating that the gases are there produced.

It may be useful to contrast the Medical Officer's opinion in 1868, with what it was in 1872. In the former year he seems to have had no idea of the decomposition going on in the sewers, as he then speaks of the modern water-closet as a "great luxury," as it gets "instantly rid of the foul matter."

—Page 127. However, to do that gentleman justice, we shall quote his opinions in parallel columns.

1868.	1872.
"It was *accurately* stated that the evils inseparable from the W. C. system were likely to be less felt in Glasgow than in many other places, *owing to the considerable fall of the greater number of the sewers*, and the almost unlimited supply of water by which the matter was diluted." GLASGOW MEDICAL JOURNAL, *November*, 1868.	"It has been conclusively shown, that houses presumed to be beyond suspicion of any possible danger to health from this cause—houses in which the most skilful engineers and architects had, as they believed, exhausted the resources of modern sanitary science—have, nevertheless, been exposed in a high degree to the diseases arising from air in contact with the products of decomposition in the sewers. And this for a very obvious reason. *Such houses are usually built on high levels, where the drains have a very rapid fall.*"

The italics (which are our own) show that in 1868 the rapid fall in the sewers preserved Glasgow from sewer gas,—in 1872, the same rapid fall renders houses in high levels "exposed in a high degree to disease."

The Medical Officer kindly offers to give every assistance to overcome inertia on this matter—but whence came the inertia—or why complain of it, when, after five years' service, he himself tells us in 1868 that Glasgow has little to fear from sewer gas? How have the sewers become so bad since then—what are the grounds of the Medical Officer's sudden change of opinion—and what confidence can the public, or public authorities have in his leading?

There is matter of congratulation that the Medical Officer is now alive to this "ever-abiding source of danger;" but it is a pity that so many years have elapsed meanwhile, and so many

valuable lives sacrificed. After carefully reading and re-reading his very well written memorandum, (albeit of opinions held by others long ago), I do not see one word to tell us how these noxious gases are produced, and, if we are ignorant of this, all our remedial measures must be entirely empyrical, in fact, groping in the dark; and under the influence of panic and ignorance works will be ordered to be executed, which a fuller and truer knowledge of the subject would have shown to be inadequate to meet the danger.

I should like to know how much the facilities for sewer gas getting into houses have been extended by the enforced introduction of water-closets and sinks, and whether this was done by the order or with the sanction of the Sanitary Office, acting under the instruction of the Medical Officers.

In 1868 I condemned the introduction of water-closets into workmen's houses, and I observe that Dr. Littlejohn, Medical Officer of Health for Edinburgh, is of the same opinion. He says, "That if they took a range of houses where this had been done, in the course of one year there were double the number of deaths from typhoid and scarlet fever; and any epidemic fever occurring in these houses was intensified, and assumed a character of malignant mortality."—(*Edinburgh Daily Review*, January 18.)

As to remedial measures, I would suggest the following:—

1st. That all soil pipes should be carried up to the roofs of the houses, and left quite open to the external air, and, if possible, the soil pipe should also be used to carry off the rain water from the roof. Landlords would be more than compensated for this expenditure, by the increased duration of the soil pipes.

2nd. Water for domestic use should be taken from the main.

3rd. Where cisterns are still in use, a charcoal cage, to be refilled from time to time, should be placed in the overflow pipe; or, better still, the overflow pipe should not be connected with the sewers, but should pass directly to the back of the house, and any overflow would be at once detected.

4th. All over the city, and especially at the highest levels, the sewers should be connected with the furnaces of some of our large public works. More than three years ago I proposed that this should be done, so that all the foul air from the sewers should be burned.

But all these would be mere palliatives—I hold that the only true sanitary solution of the question is—that provision be made to keep all excreta and organic refuse out of the sewers and water courses.

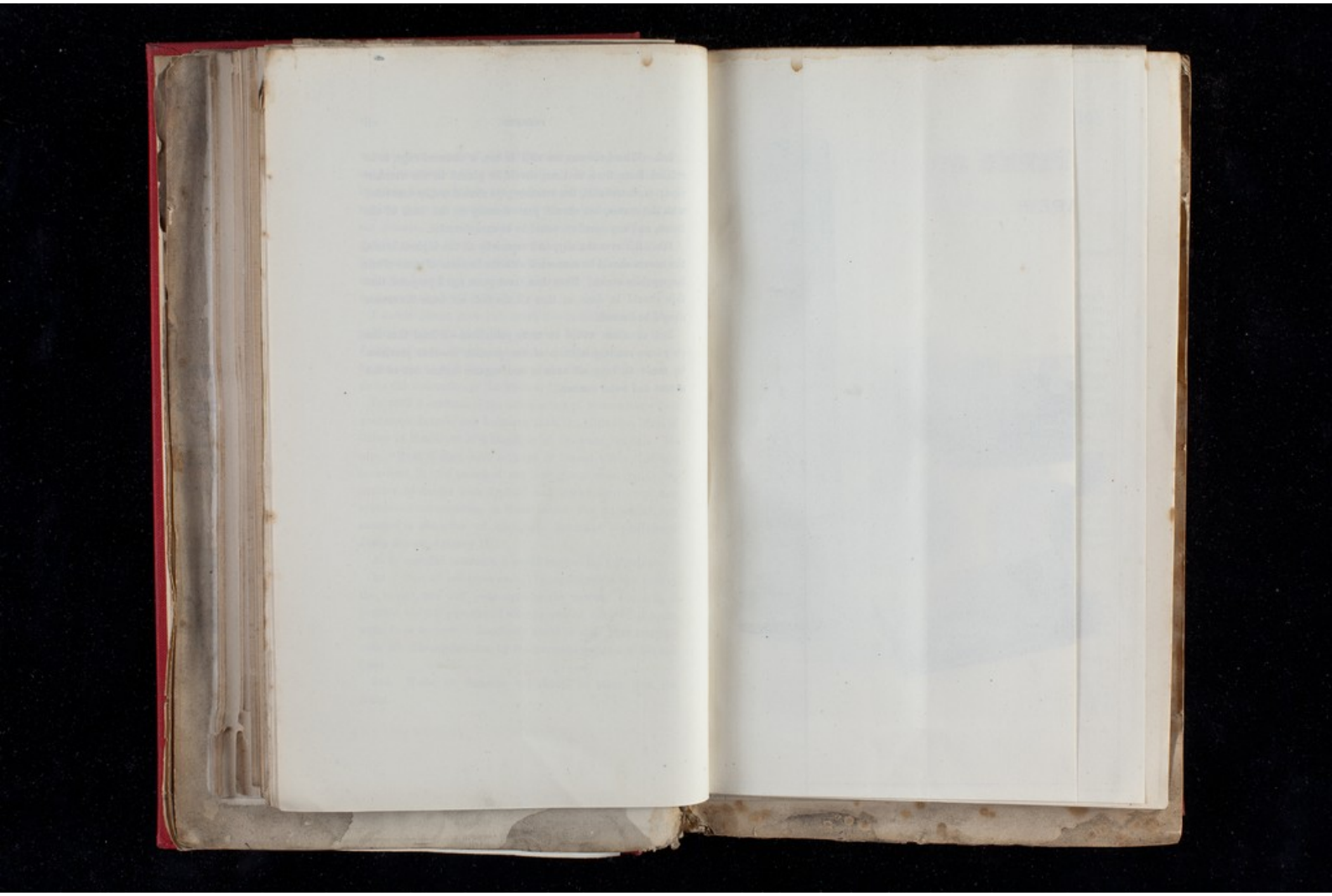
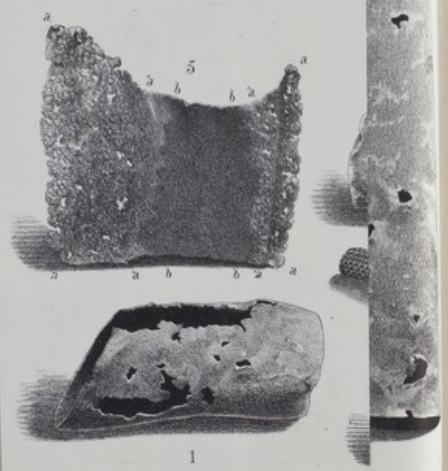


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7

SANITARY ASPECT OF THE SEWAGE QUESTION;

WITH REMARKS ON

A LITTLE-NOTICED CAUSE OF TYPHOID FEVER, AND OTHER ZYMOTICS.

By ANDREW FERGUS, M.D., Etc., Glasgow.

(*Read before the Medico-Chirurgical Society of Edinburgh, and reprinted from the Edinburgh Medical Journal for February* 1872.)

I began the study of this question long ago, with a mind thoroughly unprejudiced on the subject. The longer I study the matter, and the more I read, I become more and more convinced that our present system of water-carriage is a mistake, and was begun in ignorance of the results that would flow from it. It is, moreover, very wasteful, and highly deleterious to public health. I hold with Lord Palmerston that "dirt is merely useful matter in a wrong place," and that, if we would only observe the economy of nature, we would find there is no loss, no such thing as waste; but that, on the contrary, what is superfluous in one order of organized nature is food for another.

Thus, we see that the secretions given off by animals involuntarily are utilized; as, for example, the carbonic acid given out so abundantly by animals is absorbed by plants. Some secretions, however, are left under our own control, and in the disposal of these we experience great difficulty, simply, as I believe, because we do not adopt the method pointed out to us by nature. Earth being the original parent, everything taken from it should be restored to it again—the true rotation is, from earth to plants, from plants to animals, and from animals back to the earth again. We have

DESCRIPTION OF PLATE.

Fig. 1.—Pipe removed from a house where there was typhoid. Two months before it was taken out, the water-closet had been renewed, but the plumber had failed to detect the state of this pipe.—P. 7.

Fig. 2.—A piece of lead soil-pipe slightly corroded, which entered an iron pipe below a water-closet. The iron pipe much perforated, allowing an escape of sewer-gas, which produced fatal diphtheria.

Fig. 3.—Perforated soil-pipe from house where party died of phthisis.—P. 6.

Fig. 4.—Wire cage, filled with seaweed or other charcoal, to put into the overflow pipe of cistern.—P. 8.

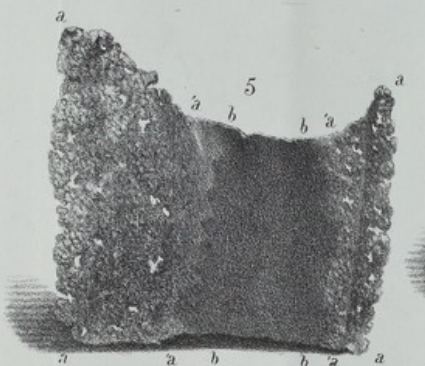
Fig. 5.—Soil-pipe laid open, in which, so numerous were the perforations, that very little of the lead required to be cut. The sides *a a*, *a a*, are irregular owing to these perforations, and they may also be seen over the whitish part. The spaces between *a a* and *d d* are the parts of the soil-pipe covered with the whitish deposit spoken of in the paper. The part within the *b*'s is the lower segment of the pipe over which the sewage flowed. It is quite sound—not in the least decayed or worn.—P. 5.

Fig. 6.—Pipe from Edinburgh. It will be noticed that the solder has not decayed, *e*.—P. 7.

Fig. 7.—Main descending soil-pipe, showing the perforations.

Plate of Decayed Soil Pipes &c.

REFERRED TO IN Dr FERGUS' PAPER.


a
a
a

not followed this rotation of nature, and hence all our difficulties have arisen.

Those excretions which have a high commercial value, and would materially assist in enriching our land, we have passed into our rivers and streams, rendering these in many places nothing better than cesspools.

I adduce in proof of this, the condition of three rivers—the Thames, the Tyne, and the Clyde. On both banks of the Tyne there are a vast number of chemical works; I am told that 45 per cent. of all the alkali made in Britain is manufactured there, and that the manufacturers are in the habit of passing the refuse matter into the river in a much more acid state than elsewhere; yet, three years ago, I saw salmon passing quite freely to the upper reaches of the river.

In 1847, an Act was passed compelling all the privies, etc., of London to be drained into the river, and we all know how soon it became foul. On the Clyde we have plenty of chemical works, but in Glasgow alone about 32,500 water-closets; and I think it is a fair inference to deduce, that these are the chief causes of the pollution of the river. Salmon passed freely up until the rapid introduction of water-closet s.

All organic matter, *i.e.*, matter capable of putrefaction, is injurious. I shall only give one instance of this sort of nuisance, viz., pot ale from distilleries. Mr Smith tells me that from one of these distilleries there are 500,000 gallons per week, each tun of which contains organic matter to the value of 3s. 6d. a tun. Now, if a law was passed, excluding all organic matter or refuse from the sewers, it would compel the proprietor of this distillery to make a large revenue from what he now wastes, and by which he creates a nuisance.

The question arises, Is the condition of rivers, when loaded with organic refuse in a state of putrefaction, injurious to health? Bad as they are, and utterly shocking in an æsthetic point of view in summer, I really do not think that they are so. The question has been often discussed, but I have never yet heard anything going to prove that rivers in this state were hurtful to health, neither do we find that the diseases which proceed from excremental pollution prevail in the neighbourhood of rivers which are thus befouled. I should like this to be distinctly and clearly borne in mind by those gentlemen who take an interest in sanitary matters, because if they look merely to the purification of rivers, the result will be unsatisfactory, inasmuch as though the rivers *were* rendered quite pure, there would be no gain as regards the health of the community. I hold, that if we wish to purify our rivers, diminish the death-rate, and improve the health of the water-closet towns, we must stop the decomposition of excreta and other organic matters in the sewers, from which gases capable of producing disease arise.

Fresh excreta are not injurious to health, it is only when they decompose that they are so; and the most favourable circumstances

to facilitate this are, that they should be placed in narrow passages, with a limited supply of air and water.

In a word, our cesspools and sewers are ingeniously-contrived chemical laboratories for the production of sewer-gas.

I wish I could bring to the surface, and exhibit to you in all their hideousness, the sewers of any large city. We should find them of great variety, viz., old water-courses arched over; and the sewers, some circular, some oval, and, I fear, still some square. At the bottom of most of them we should find a thick, blackish, tenacious mud, and flowing over it a dirty, sluggish stream, slowly, silently, yet continually giving out sewer-gas. Sinking the sewers to their unsightly bed, let us look at the manner in which they are connected with our houses by water-closets more or less out of repair, and more or less imperfect, some of them being merely pipes, with no pretence of a pan, passing directly into the sewers, and thus becoming a source of danger. Another source is by means of fixed basins or sinks, some of them in our bedrooms, and within a few feet of our beds.[1]

I may be told, perhaps, to trap and ventilate the sewers, but, of course, if we trap in one place we but leave more to escape in another; in fact, this would only be to exclude a poisonous gas from our own houses that might find its way into our neighbour's, who, perhaps, might not be so well protected. Ventilation is not easy, and is very costly. Mr Bazalgette estimates that the ventilation of the sewers in London would cost £460,000, with an additional annual expense of £201,480 for fuel, exclusive of labour; flushing with water would cost £381,250.[2]

Supposing that we have trapped our sewers, and carried a ventilating pipe to the roof, we have not destroyed the poison, but merely diluted it. Instead of passing into our houses, it passes over them, and must have an injurious and lowering influence on the health of the surrounding inhabitants, the air being thus more or less contaminated.[3]

[1] When talking over this subject with the late Sir James Simpson, he told me of a row of houses which, by way of being *improved* (?), had sinks placed in them. Typhoid fever had up to that time been unknown in these houses, but very soon afterwards it broke out, and passed through the whole range.

[2] More than three years ago, I made a proposal to ventilate the sewers of Glasgow, by having them connected with the furnaces of some of the numerous public works in that city, which could have been done with very little cost.

[3] To show how slight a contamination of air will produce disease, allow me to mention a case which came under my own observation a few weeks ago. A youth was fishing for, and caught two trout; fourteen days afterwards (period of incubation) symptoms of typhoid fever appeared. His father, a most observant and intelligent medical man, remembered that a sewer, entering the stream near where his son had been fishing, had been opened for repair at the time; therefore, although the sewerage was not strong enough to kill the trout, the atmosphere was so tainted that its inhalation produced typhoid fever. I made particular inquiry into this case, and found that the youth had not drunk any of the water of the stream; neither, so far as was known, had he been in any other way exposed to the result of excremental pollution.

This sewage gas is always being formed, is generally lighter than air, and frequently hotter. It follows that it must often be in a state of tension, that it will ascend, and, if possible, escape at the highest point. When it does so into the streets, if the outside temperature is very low, we shall see the watery vapour condensed like steam.

Many people rush quickly past these sewer gratings in a cold winter day to avoid the pestilential vapour, and greatly pitying the poor people who are obliged to live in such a neighbourhood; never suspecting that the very same vapour may be entering their own houses, although invisibly, owing to the higher temperature within.

It may be asked, How can this gas get into our houses if the water-closets are in perfect working order, and the drains in good condition and well trapped? I answer, that it is not easy to trap the drains thoroughly. People imagine that if they have a few inches of water in a bent tube, dignified by the term "syphon trap," that no air can pass into their houses from the sewers; and certainly there will not, so long as the pressure is equal on both sides of the water in the bent tube. But if rain rapidly fills the drain with water, or if the drains open into a tidal river, at the time of high water there is a great pressure on the air in the sewer, and it forces its way into our houses through any trap that has yet been invented. The gas being in a state of tension will escape as the barometer falls. In familiar illustration of this, we sometimes hear people predicting rain from perceiving a disagreeable odour; and correctly so—the falling atmospheric pressure being the precursor of rain as well as the liberator of the sewer-gas.

This contamination of air in sewers will vary in different localities and at different seasons of the year. Generally the amount of oxygen is diminished; and we find as impurities in air from sewers —carbonic acid, light carburetted hydrogen, sulphuretted hydrogen, and fœtid organic matter, which last is probably the principal cause of the extreme unhealthiness of sewer air. At the Sewage Conference at Leamington, one of the most philosophical physicians (Dr Benjamin Richardson) gave a list of fifteen diseases that may all pass from, or be conveyed by, sewage.[1]

When we look back to the epidemics of the middle ages and some centuries ago, we readily acknowledge that, if they were not directly caused, they were enormously aggravated, by the habits of the people. If any of these epidemics reappear, why should we not attribute it to the same cause? We are given to congratulating ourselves on having, by our improved sanitary arrangements, got quit of the plague, sweating sickness, etc., etc.; but if some

[1] Dr Richardson's Table of Diseases from Organic Poisons:—"The diseases which may be produced by the organic poisons are as follows:—Smallpox, measles, scarlet fever, diphtheria, typhus fever, typhoid fever, erysipelas, hospital fever, puerperal fever, cholera, yellow fever, ague, glanders, boil and carbuncle, infectious ophthalmia. This is a long list of diseases, amounting to fifteen in number, mainly traceable to the poisons which, as I have said, may pass from the sewage."

bypast and long latent epidemic reappears, why should we not look to the same cause as before as its probable generator? or why should we not inquire if some of our present and most fatal epidemics may not be produced by, or owe their intensity to, a similar origin?[1]

Mr Simon very pertinently asks why diphtheria, which scarcely had a place in history till it overran Europe in the sixteenth century, and which since then has scarcely been spoken of, should recently have become an important disease in England?[2]

The answer to Mr Simon's question is simply this:—We have been careless in the disposal of our excretions, and have been drinking water or breathing air contaminated with excretal matter in a state of decomposition. For details proving this, as regards outbreaks of diphtheria, I refer to the Second Report of the Medical Officer of the Privy Council—see pages 167, 168, 171, 172; and in the Eighth Report, page 251. Typhoid fever, killing in England 15,000 to 18,000 people annually, is another disease resulting from excremental pollution.

All modern investigators agree in this; and there is seldom a week but in one or other of the medical journals we do not find an account of some outbreak of zymotic disease from excremental pollution.

In the last Report of the Medical Officer to the Privy Council, published a few months ago, I find a table of the places visited by the Inspectors owing to increased death-rates. The total number of places so visited is 66; but 6 of these being double entries, reduces the number to 60; and in 50 of these the increased death-rate was traced to excremental pollution, producing typhoid fever in 49 and scarlet fever in 16 of these infected places.

In most of these cases the water was befouled; but as this is so well known as a cause of disease, and has been so amply proved, I shall not dwell upon it, but rather enter somewhat more in detail on another source of typhoid and other zymotic diseases which is not so well known, and cannot so easily be guarded against.

About fifteen years ago I first detected perforated soil-pipes. At first I merely looked upon them as a nuisance, because offensive, and did not connect them with disease; neither did I then know how these perforations were produced.

In the first pipes I inspected, as the perforations were on the upper side, I imagined that pieces of lime might have dropped down on the pipes and eaten their way through. This opinion I abandoned, as I found the perforations were from within. I also found that they were generally on the upper surface of the pipe, and that,

[1] It may be mentioned here that cholera did not prevail in this country till after the adoption of water-closets; neither had diphtheria been epidemic for 200 years till we adopted this system.

[2] I append a table, from which you will perceive that there are no deaths till 1851; in that year there were only 40, and till 1857 the numbers varied from that to 310. It then suddenly increased—reaching its maximum, 2587, in 1859. The total deaths till 1868 are 54,872.

therefore, the destruction could not be caused by fluid conveyed through it. I also observed that the pipe usually affected in this manner was the cross one, leading from the closet to the main descending soil-pipe; and that if there was a bend or arch in the pipe, the upper surface of the bend or arch would become perforated. Another element to be taken into consideration is, that these perforations are most frequently found in the upper flats of houses, and, occasionally, in the sides of the descending soil-pipes.

The question now arises, How is this destruction of good well-made lead pipes effected?

If we remember the position of this destructive action in the pipes, and take into consideration the results of chemical analysis,[1] as well as the increased rapidity with which this action takes place in pipes that are not ventilated, I think we are justified in coming to the conclusion that these results are owing to the action of sewer-gas. If you will carefully notice the specimens you will perceive that the destructive action is from within, and that in some places the pipes are more or less corroded even where the action has not gone the length of complete perforation (fig. 5).

Of course, my own discovery of such pipes in houses has only been where I have been attending professionally, and where the diseases were of such a type as are known to be produced by breathing the results of the decomposition of excreta. The diseases I have observed as resulting from this state of pipes are typhoid fever, diphtheria, scarlet fever, diarrhœa, etc.; and in one or two cases I have had to order the removal of families who were suffering from ill-health from this poison, without exhibiting symptoms of any well-defined disease. As the investigation of the causation of disease is carried out, I believe that the list already given of those diseases produced or conveyed by sewage will be increased. In two cases of phthisis in people long past middle life, I could not attribute the disease to any other cause. The family history was good, the mode of living correct, and the general health satisfactory up to the time of the soil-pipes becoming corroded (fig. 3).

About three years ago I was asked to visit the child of the superintendent of a large public institution. I at once suspected typhoid fever, which proved to be the case. I was, moreover, told that it had twice already been in this gentleman's family; and that the year before the whole family had suffered from diphtheria. On making inquiry as to the state of the drainage, water-supply, etc., I was told that the water was Loch Katrine, and so beyond suspicion. The master of works for the institution was a most intelligent man, who had paid special attention to the drainage. He had soil-pipes with extra depth of traps, indeed the deepest I have seen, and it was difficult to account for the manner of infection, the pipes being pronounced free from any defect; but, in a short time, another child was seized, as well as several of the officials of the institution. In passing a particular spot in the superintendent's house, however, I perceived a faint odour of sewer-gas; and, on mentioning this to him, he most promptly had the pipes uncovered, and perforations were at once discovered in the vertical soil-pipe.[1] This led to a complete overhaul of all the pipes in the house, and the removal of those that were defective; and since then I have not heard of a single case of typhoid or diphtheria in the establishment. Plumbers do not readily detect this defective state of pipes, as they look for a liquid leakage. Some time ago, in visting a case of typhoid, I asked the mother of my patient as to the state of the closet and pipes. She replied, "Oh, Doctor, you are wrong this time; all these things were renewed only two months ago." Of course I was extinguished; but still ventured to inquire what might be the cause of a very perceptible, and by no means agreeable, odour. A dead rat was suggested as its possible origin. However, as it was no matter to trifle with, I requested that the plumber might be sent for, and also that he should be told that the soil-pipe close to the cross-pipe was eaten away (fig. 6).

At my next visit, the lady told me that the plumber had been very much astonished to find the pipe exactly in the state I had predicted. I now exhibit the pipe. I have been told that this state of pipes must be peculiar to Glasgow, and must be produced by some chemicals getting into the sewers; but I have made many inquiries, and find the same thing existing in every water-closet town in reference to which I have had information. This, the worst specimen on the table, is from Edinburgh, where there are few chemical works (fig. 6). Lead has generally been used as the material for soil-pipes, and as we have seen how capable it is of corrosion, it becomes a very important sanitary question to inquire how long a good lead soil-pipe will hold out. I have been studying this question for several years, and it is now about five since I first exhibited pipes in public, yet I would not wish to dogmatize on the subject, but rather give approximations, and would remark that the time will vary under the various circumstances according to the strength and rapidity of flow of the sewage, as well as the original thickness of the pipe. But after allowing for this, we must broadly distinguish between soil-pipes which are ventilated and those which

[1] By Mr Stamford's kind permission, I am enabled to give the analysis of the inner coating of these pipes:—

Carbonate of lead, . .	2·70	86·00	91·00	92·90
Carbonate of lime, . .	80·63	2·50	2·10	2·90
Water, ...	0·45	1·20	1·00	0·50
Lead insoluble as oxide, .	—	3·50	1·50	1·45
Silica, ...	1·35	2·80	1·00	1·60
Organic matter, . . .	14·87	4·00	3·40	0·65
	100·00	100·00	100·00	100·00

The analysis No. 1 indicates that probably chloride of lime had recently been used to destroy the effluvia from the already perforated pipes.

[1] I would by no means be understood to say that smell, merely as such, produces disease; it is simply a quality of what in this case does so.

are not. By the former I mean when the pipe is carried up to the roof of the house and open to the external air; by the latter I mean when the pipes are closed up. Of these last mentioned, the duration may be stated to be about twelve years, the extremes of variation being from a minimum of eight to a maximum of twenty years.

In ventilated pipes the duration may be stated to be nearly double, running from twenty-one to twenty-three years, the extremes of variation being from eighteen to thirty or even more years. The practical sanitary conclusion which it concerns us all to keep in mind is, that any house, no matter how carefully and well built, may become unhealthy from this source, and that when cases of typhoid fever, diphtheria, etc., occur, the pipes should be thoroughly inspected—especially their upper surface—and the whole of the soil-pipe uncovered.

I must strongly insist on this, as in many cases the plumbers have declared the pipes to be all right, which turned out to be very defective when uncovered. For some years back, I have insisted on a careful examination of the soil-pipes wherever I have cases of typhoid or diphtheria, and in every case where I could get this carefully carried out, I have detected these perforated pipes.[1]

What first led me to connect this state of soil-pipes with disease was the fact that, as regards water-supply, Glasgow should not be exposed to diseases resulting from excremental pollution; and if we have these diseases, we must attribute them to some other source.

Another way in which sewer-gas may act injuriously, is by its passing up the waste-pipe of the cistern, and becoming absorbed by the water. In houses that have been shut up for a few months, this should be guarded against by running off all the water, and clearing out the mud at the bottom of the cistern, before the houses are re-inhabited. I also propose to insert into the waste-pipe a long wire cage with a circular head, and to keep this filled with seaweed or other charcoal, which should be replenished from time to time (fig. 4). Of course it would be much better if all water used for cooking or drinking were drawn direct from the main.

It would prolong the duration of the pipe, and be an important sanitary improvement, if the soil-pipes were in every case carried up to the roof, and left quite open to the air. The expense of this would be more than compensated to the landlords by the greatly-increased duration of the lead pipes.

Another group of diseases arising from excremental pollution are the diarrhœal, including cholera. I need not, I think, insist that this last disease is the direct consequence of taking into our system the results of excremental pollution. Instead of going into any proof of my own as to this, I shall quote from the admirable and vigorous language of Mr Simon. In the Eighth Report, page 39,

[1] Except in one case, where the patient had only returned a few days previously from the country, and where I found, from making inquiry, that the water in the country house was impure.

he thus writes:—"When cholera is epidemic in any place, persons who are suffering from the epidemic influence, though perhaps with only the slightest degree of diarrhœa, may, if they migrate, be the means of conveying to other places an infection of indefinite severity; but the quality of infectiveness belongs particularly, if not exclusively, to the matters which the patient discharges by purging and vomiting from his intestinal canal; that these matters are comparatively non-infective at the moment when they are discharged, but subsequently, while undergoing decomposition, acquire their maximum of infective power; that choleraic discharges, if cast away without previous disinfection, impart their own infective quality to the excremental matters with which they mingle in drains or cesspools, or wherever else they flow or soak, and to the effluvia which these matters evolve; that if the cholera contagium, by leakage or soakage from drains or cesspools, or otherwise, get access, even in small quantity, to wells or other sources of drinking water, it infects in the most dangerous manner very large volumes of the fluid; that in the above described ways, even a single patient with slight choleraic diarrhœa may exert a powerful infective influence on masses of population, among whom, perhaps, his presence is unsuspected; that things such as bedding and clothing, which have been imbued with choleraic discharges, and not afterwards fully disinfected, may long retain their infectious properties, and be the means of exciting choleraic outbreaks wherever they are sent for washing or other purposes."

Again, in Report Ninth, pages 33 and 34, Mr Simon thus powerfully writes:—"It cannot be too distinctly understood, that the person who contracts cholera in this country is, *ipso facto*, demonstrated with almost absolute certainty to have been exposed to excremental pollution; that what gave him cholera was (mediately or immediately) cholera-contagium—discharged from another's bowels; that, in short, the diffusion of cholera among us depends entirely upon the numberless filthy facilities which are let exist, and specially in our larger towns, for the fouling of earth, and air, and water, and thus secondarily for the infection of man, with whatever contagium may be contained in the miscellaneous outflowings of the population. Excrement-sodden earth, excrement-reeking air, excrement-tainted water—these are for us the causes of cholera. That they respectively act only in so far as the excrement is cholera-excrement, and that cholera-excrement again only acts in so far as it contains certain microscopical fungi, may be the truest of all propositions; but whatever be their abstract truth, their separate application is impossible. Nowhere out of Laputa could there be serious thought of differentiating excremental performances into groups of diarrhœal and healthy, or of using the highest powers of the microscope to identify the cylindro-taenium for extermination. It is excrement indiscriminately, which must be kept from fouling us with its decay.

"The local conditions of safety are, above all, these two—(1)

that, by appropriate structural works, all the excremental produce of the population shall be so promptly and so thoroughly removed, that the inhabited place, in its air and soil, shall be absolutely without fæcal impurities; and (2) that the water-supply of the population shall be derived from such sources, and conveyed in such channels, that its contamination by excrement is impossible."

"It is to be hoped that, as the education of the country advances, this sort of thing will come to an end; that so much preventable death will not be always accepted as a fate; that for a population to be thus poisoned by its own excrement, will some day be deemed ignominious and intolerable."

As regards diarrhœa, Dr Greenhow reports, and Mr Simon endorses his opinion, that the deaths from this cause vary from 4 in every 100,000 of the population, to 663 in the same number. He calculates that if the diarrhœal death-rate could be restricted in the whole of England to ten times the minimum death-rate of 4, there would be a saving of 20,000 lives annually, and there would be a great reduction in the deaths from typhoid fever also. Both Mr Simon and Dr Greenhow are of opinion, that the excess of mortality from these diseases has in all places been coincident with one or other of two definite local circumstances: (*a*) the tainting of the atmosphere with the products of organic decomposition, especially of human excrement; or (*b*) the habitual drinking of impure water.

Before turning our attention to remedial measures, allow me to remark, that water-carriage was adopted in ignorance of the results that would flow from it. It was known that water and air oxidize excreta, and it was supposed that we had nothing more to do than merely to pass these matters into streams to be rid of them. The result has amply proved that no river in the kingdom can oxidize the excreta of the towns on its banks. We have had our rivers rendered gigantic cesspools; and though many schemes have been proposed for the treatment of sewage, most of them have failed when brought to the touchstone of scientific research.

The plan of sewage irrigation has many advocates, and therefore I shall offer a few remarks upon it. No doubt it would in some degree utilize the sewage, but it would not in the least improve the sanitary condition of water-closet towns. Its advocates assert that it will carry the excreta *fresh* to the soil, in refutation of which I shall simply advert to the case of Croydon.

I do so, *first*, Because it is a very perfect specimen of sewage works carefully carried out under the most favourable circumstances; *second*, Because the advocates of sewage irrigation insist that the excreta ought to be carried *fresh* to the soil; and, *third*, Because the engineer tells us that the time from the closet, through the drains, through the straining-beds, and out again into the river, varies from a minimum of four to a maximum of six hours.

If this is correct, it follows that at Croydon there should be no gas, it being a well-known fact that excreta take at least twenty-four hours to decompose and give off gas.[1] At Croydon, then, there should be no need of sewer ventilation, yet Dr Carpenter, who highly approves of the system pursued there, tells us that from some mal-arrangement of the pipes in his house, sewage-gas passed into it, with a force resembling the escape of steam, and produced typhoid. As recently as the 6th of this month (January), I see there is a letter from him in the *British Medical Journal*, giving an account of an admirable method adopted in Croydon to destroy sewer-gas by charcoal. From this it is evident, *1st*, that the excreta are *not* passed on fresh to the land; *2d*, that it must take much longer than the theoretical time to pass from the closet, through the pipes, and over the meadows. I suppose the mistake may have in part originated in supposing that sewage matter will flow as rapidly through pipes as pure water; but if we have sewer-gases at Croydon, with its recently and admirably constructed sewers, and their favourable fall, what would we have if we attempted sewage irrigation in towns less favourably situated, where the drains are not nearly so well constructed, far more numerous and complicated, and where we might find it necessary to pump the sewage? Another objection to sewage irrigation is, that if the sewage is pumped, in all probability the liquid will be pumped up and the gas left. This was confirmed by the results of drainage works in twenty-five towns in England. In nine of them there was a reduction of more than 50 per cent. in the cases of typhoid; in ten, a reduction of from one-half to one-third per cent.; while in four, there was either a slight decrease or an absolute increase. In these four, the sewage was pumped. It was quite expected that as drainage works were carried out there would be a diminution in zymotics, but experience proves that it has also a favourable influence as regards phthisis. In fifteen towns there was a reduction of deaths from this source of from 49 to 11 per cent. No large city has yet adopted the process of irrigation for the whole of its sewage, and in places where it has been adopted the Birmingham Report complains that it is very difficult to get an account of the financial results.—(Birmingham Report, p. 69.)

The latest estimate allows one acre for every 20 to 30 of the population, and at such a rate you can easily calculate how many acres a city like this would require. To meet this difficulty, intermittent downward filtration has been proposed; but as by it the greater part of the manurial value is lost, I shall not enter upon it.

The most fatal objection to irrigation, and indeed every other scheme for the treatment of sewage, is that they do not meet the sanitary difficulty. Before the sewage is taken to the land or submitted to any of the numberless patent schemes, the whole mis-

[1] I wish it to be understood, that I do not speak as to the present state of Croydon; I am dealing with a much larger subject, and merely quote Croydon as an illustration in point. I make this remark, because when I used it on a former occasion I was misunderstood, and told that because Croydon is healthy now, I had no right to refer to it.

chief has been done, while experience has also amply proved, in regard to water-carriage, that no river in the kingdom can oxidize the excreta from the towns on its banks. Our engineers stick to water-carriage, however, with a tenacity which is most surprising,—simply, I suppose, because they are engineers, and do not know, or will not study, the other aspect of the question; yet, Mr Hawksley (Birmingham Report) says, that while the art of removing excremental refuse in water has been brought to perfection, the problem of the re-purification of the polluted waters remains unsolved. This being the case, it seems rather wonderful that engineers do not think it worth while to try other methods. The views I bring before you to-night I have long held. This paper was proposed to be read before the Prince of Wales's illness, and would have been read last month had there been an open night. I may mention that I brought the same views before the public five years ago at a Glasgow Sewage Association; three years ago I did the same at the Medico-Chirurgical and Philosophical Societies of Glasgow; and I also read papers on the subject at the Social Science meetings of Newcastle and Leeds; but in no place did I make many converts as to the evils arising from sewer-gas.

The illness of the Prince has recently galvanized many people into the greatest excitement on the subject, but I fear the effervescence may as speedily subside, and nothing be done—that we shall still go on acting contrary to nature's laws, and have the results I have been trying to point out.

In London alone, according to Mr Krepp, thirty millions of money have been spent on water-carriage—we all know with what disappointing results in a sanitary point of view.

These matters, which pollute our rivers, poison our air, and produce disease to so lamentable an extent, are of great value. I believe that £80,000 is a very moderate estimate of the value of the excreta of this city, yet we throw them away, and then ransack the whole earth for bone-dust and guano.

Sanitary science should not rest content till it has made towns as healthy as rural districts—this, at least, should be the result aimed at; and this we shall never be able to do until there is a change in the mode by which excreta are disposed of.

If cholera were epidemic in any place, I have no doubt that every intelligent officer of health would direct that the stools of all patients should be disinfected. Very probably, however, before this was carried out, the mischief would be done by the cholera contagium getting into the sewers or wells.

Why, then, not provide for such an emergency beforehand, by reserving the sewers for the rainfall, and making provision that all excreta shall not be allowed to decompose, but be disinfected,—the progress of what we may term antiseptic chemistry rendering this less and less difficult? I sum up as follows:—

1*st*, That no excreta shall be allowed to pass into our sewers, water-courses, or rivers.

2*d*, That all refuse from manufactories containing organic nitrogen and carbon—*i.e.*, putrescible matter—shall also be kept out of our sewers, water-courses, and rivers.

3*d*, That all excreta shall be submitted to chemical or other action, by which they shall be rendered non-putrescible.

As regards the second point, we would require imperial legislation to prevent organic refuse from being passed into the sewers, etc.; but I think the first and third might be carried out under the powers in the Police and Public Health Acts; and I am quite sure that the gain would, in a short time, exceed the expenditure. I am often told it would be very difficult to carry out these views, but everything really worth having is attended with difficulty, and I cannot but affirm that if a tithe of the time, skill, and ingenuity, and one-thousandth part of the money, had been devoted to investigations in this direction, which have been spent on water-carriage, the problem would have been solved long ago.

I have already said that the numberless patents which have been taken out do not meet the whole case: they either fail in the sanitary—*i.e.*, do not prevent decomposition in the sewers; or in the economic—*i.e.*, do not retain or recover all the fertilizing matters.

I shall therefore enter into no detail as regards them, but bring under your notice some plans which fulfil the requirements I have specified.

1*st*, Mr Moule's earth-closet is known to most of you, and has done well in private houses, asylums, and small villages in this country; and in India has been a very decided success. The great objection to its use in towns is the bulk of the material required. This objection is removed by employing, as Mr Stanford proposes, seaweed charcoal instead of earth. As a very small quantity of charcoal is sufficient, by an improved closet, it is expected that even less than weight for weight of excreta will be found sufficient. I have repeatedly seen Mr Stanford's process in operation, and am convinced it is in every way well worthy of trial; as it satisfies, in all respects, whatever the most ardent sanitarian could desire. The product from the closet is a black mass, somewhat like cinders, free from smell, and without the least appearance of fæcal matter. Mr Stanford considers that eight cwts. per head per annum is sufficient, and that this need only be removed once a year; and the reservoir of char at the top of the house need only be replenished once a year. The closets are arranged to be quite automatic, and require no attendance from within. Mr Stanford values the char after use at 8*s.* a head per annum, and proposes to burn it in revolving retorts, and to collect in suitable condensers the gas liquor, tar, and gas. The charcoal increases at each reburning, and therefore the plan is self-supporting, unless, indeed, the increased value of the char should render it advisable to sell it.

Mr Stanford's proposal has been so well thought of that a company has been formed to work it, and the large shipbuilders on the Clyde have agreed to adopt it; and I am also told that already

arrangements have been entered into to provide closets for works employing 12,000 men.

Captain Liernur proposed some time ago what he terms a pneumatic system of collecting the excreta, and applying it direct to the soil. The great objections to his scheme were that it would require a special plough—that we would require to be always ploughing, or the matter would accumulate, and that if frost came we would be necessitated to cease putting it into the ground.

When a community has been accustomed to water-closets, it is very difficult to get any alteration made, and therefore some schemes have been devised to retain the water-closet, but to prevent the matters from them getting into the sewers.

Mr Strang proposes an upward system of filtration. His apparatus consists of a large box, divided by a perforated bottom, the upper division being filled with cinders, ashes, or charcoal. The lower division receives the contents of the closets; as it fills the water rises through the perforated bottom, passes upwards, and flows off at the top much purified. From time to time the contents of the lower division are removed, and are of considerable value.

Mr Hoey has devised an apparatus which is intended to leave us with all the comfort and convenience of the water-closet, and yet at once to get quit of all the nuisance and dangers of that system.

It is not easy to describe mechanism without drawings, but I shall try and give some explanation of Mr Hoey's plan.

First, The water-closets are left just as they are at present.

Second, The flush-pipe is not attached to the general cistern, but to one holding only one-fifth of a gallon of water, which takes two minutes to fill. When the bar of the water-closet is raised, the supply to this small cistern is cut off, so that it is almost impossible to waste water—it could only be wasted by some one raising the bar every two minutes.

Third, A vessel like a bird-cage fountain is filled with sulphuric acid, and at each time the closet is used a portion of it is discharged with the water by means of a plunger dipping into the acid.

Fourth, The waste-pipe from the closet flows into a reservoir underground, from which the excreta are removed by pneumatic pressure without the slightest offence, and then taken to the country to be evaporated into portable manure.

Instead of the sulphuric acid, I would propose the use of common salt, to which my attention was directed by the researches of Dr Angus Smith. You will find salt very favourably spoken of in his work on Disinfectants, at page 78. At page 128, he tells us that it is seven times cheaper than chloride of lime, and fourteen times cheaper than carbolic acid; and at page 97 we read what was the effect of only two ounces on one cwt. of human excrement. The great advantages of salt are its cheapness, its thorough efficiency, as well as its being itself a valuable fertilizer of soil, and amply repaying the agriculturist for his outlay.

I would recommend the removal of the product of the closets by

pneumatic pressure, without in the least disturbing the inmates of the house. It would be conveyed to an establishment where it would be evaporated to dryness, and converted into a portable, and I have no doubt very valuable, manure.

The advantages of Mr Hoey's plan are obvious. Where water-closets are already in use, they leave our household arrangements as they at present are, and save an enormous waste of water.[1]

Then, as the excreta cannot putrefy, it follows that there need be no fear of sewer-gas getting into our houses, or of fæcal matter percolating through the soil into wells, etc. Either of these plans would at once deodorize and render innocuous the stools of patients suffering from infectious diseases; they are not expensive, and could be as easily worked as our present system; while the collected matter, after the evaporation of the water, would make a valuable manure.

All of these schemes show a profit on paper. I think, however, profit should not enter primarily into our calculations. We ought to take a broader view of the question, and ought to feel that this is a gigantic evil, and it must be got rid of. We must not go on living contrary to the laws of nature, lowering our health by breathing impure air, wasting our manure, swelling our death-rates, and robbing posterity.

I do not say which of these schemes is best, or that any of them is perfect; but they are all superior to our present system of water-carriage, and it would well become the authorities of any large community to have them tried, and to prove for themselves which is best.

In conclusion, let me emphatically say, that the only true sanitary solution of this question is that all excretat must be kept out of our water-courses and rivers—nay, I go further, and affirm that if it is true, as Dr Benjamin Richardson tells us, that fifteen organic poisons may pass from sewage—if it is true that diarrhœa, cholera, and enteric fever (the first and last killing 35,000 per annum), are traceable to the imbibition or inhaling of the results of decomposing excreta—if it is true that the same causes lower the health and swell the death-rate from other diseases—then I say, that the only satisfactory solution of our difficulty will be found by making pro-

[1] To test the powers of this limited supply of water to keep a closet clean, I had one fitted up in my own house, with a cistern only containing ½ of a gallon of water.

It has now been in use for more than two years, and is quite as clean as others in the same house where the supply is unlimited.

If such a closet was generally adopted, there would be a saving of water of several gallons a head.

Mr Hoey tells me that the expense of altering a water-closet to suit his apparatus would be 13s., and that two guineas would be the amount required to put in a tank for six closets, making the expense for each about 7s.

As regards the utilization of the matter from such a closet, I may mention that Mr Chapman has bought the urine from the public urinals of Glasgow from the Police Board for £1000 a year; and he tells me that if the excreta are diluted with not more than four times their bulk of water, he can utilize them. He has already fitted up extensive works for the treatment of the urine.

vision that all excreta shall, within twenty-four hours of being voided, either be returned to the earth, or shall be subjected to chemical processes before decomposition takes place.

TABLE *showing the* NUMBER *of* DEATHS *in* ENGLAND *from certain* ZYMOTIC DISEASES, *in each Year for which the Record has been made, from* 1838 *to* 1868, *which may be read along with Dr Richardson's List of the Organic Poisons* (p. 4).

Years.	Scarlatina.	Diphtheria.	Measles.	Hooping-Cough.	Smallpox.	Fever.	Diarrhœa, Dysentery, & Cholera.	Total.
1838	5,802	...	6,514	9,107	16,268	18,775	3,440	59,906
1839	10,325	...	10,937	8,165	9,131	15,666	3,493	57,717
1840	19,816	...	9,326	6,132	10,434	17,177	4,799	67,684
1841	14,161	...	6,894	8,099	6,368	14,846	4,198	54,566
1842	12,807	...	8,742	8,091	2,715	16,201	7,622	56,178
1847	14,697	...	8,690	9,260	4,227	30,994	15,630	83,498
1848	20,502	...	6,867	6,862	6,903	22,037	15,604	78,775
1849	13,111	...	5,464	9,615	4,645	18,347	74,155	125,337
1850	13,370	...	7,080	7,770	4,666	15,375	14,400	62,661
1851	13,594	40	9,370	7,905	6,997	17,930	18,045	73,881
1852	18,813	74	5,846	8,022	7,320	18,641	21,754	80,470
1853	15,653	46	4,895	11,200	3,151	18,554	20,502	74,001
1854	18,325	203	9,277	9,770	2,808	18,893	42,092	101,368
1855	17,128	186	7,354	10,185	2,525	16,470	15,044	68,892
1856	13,931	229	7,124	9,225	2,277	16,182	15,912	64,880
1857	13,919	310	5,969	10,138	3,936	19,016	24,037	77,325
1858	25,481	4,836	9,271	11,648	6,460	17,883	16,004	91,583
1859	19,907	9,587	9,548	8,976	3,848	15,877	20,597	88,340
1860	9,681	5,212	9,557	8,555	2,749	13,012	11,185	59,951
1861	9,077	4,517	9,055	12,309	1,320	15,440	20,999	72,717
1862	14,834	4,903	9,800	12,272	1,628	18,721	12,667	74,825
1863	30,475	6,507	11,349	11,275	5,964	18,017	16,801	100,288
1864	29,700	5,464	8,323	8,570	7,684	20,106	18,366	98,213
1865	17,700	4,145	8,562	8,647	6,411	23,034	25,894	94,393
1866	11,685	3,000	10,940	15,764	3,029	21,104	32,644	98,166
1867	12,300	2,600	6,588	11,873	2,513	16,862	21,735	74,471
1868	21,912	3,013	11,630	9,223	2,052	19,701	32,427	99,958
Totals	438,706	54,872	224,972	258,656	138,029	404,861	539,046	2,190,144

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EXCREMENTAL POLLUTION,

A CAUSE OF DISEASE;

WITH

HINTS AS TO REMEDIAL MEASURES.

BY

ANDREW FERGUS, M.D.

(A paper read at the Social Science Congress, Leeds, October, 1871.)

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EXCREMENTAL POLLUTION.

SANITARY science should never rest content till our towns have become as healthy as our rural districts; this at least should ever be the result aimed at. The question as to the causes of the unhealthiness of our towns is a very large one, and I intend merely to touch upon one of them, namely, how much of this unhealthiness is due to the way in which the excreta of the inhabitants are disposed of, also whether there can be any sanitary improvement in our modes of dealing with them.

We all know that some of our excretions are at our own disposal, and that some are not. If we trace the latter we shall find that they are at once utilized, and that thus the balance of nature is kept up. The carbonic acid continually given off by living beings is returned to the vegetable world whence it was originally derived, and in this way the correct rotation of nature is kept up. Certain of our other excretions are left to our own control, it is in the disposal of these we act contrary to nature, and have the most dire results. I believe that had the rotation of nature been followed in regard to them, and had these excretions been returned to the earth in a fresh state, or had they been prevented from decomposing, we should have had a very marked diminution in the mortality of our cities, and even an improved state of health in our villages and private houses.

I do not enter into minute details, but shall take a few leading diseases to illustrate the mischief that arises from excremental pollution. Dr. Benjamin Richardson, at the Sewage Conference at Leamington, gives a list of fifteen diseases that may be conveyed by sewage.* When we look back to the epidemics which prevailed some centuries ago, we readily acknowledge that if they were not directly occasioned by the habits of the people they were much aggravated by them. If any of these re-appear there is no reason why it should not be attributed to the same cause. We congratulate ourselves on having, by our improved sanitary arrangements, got rid of such diseases as the plague, the sweating sickness, &c., but in the event of any long-latent epidemic reappearing, we shall do well

* Diseases from the Organic Poisons.—The diseases which may be produced by the organic poisons are as follows:—Small-pox, measles, scarlet fever, diphtheria, typhus fever, typhoid fever, erysipelas, hospital fever, puerperal fever, cholera, yellow fever, ague, glanders, boil and carbuncle, infectious ophthalmia. This is a long list of diseases, amounting to fifteen in number, mainly traceable to the poisons which, as I have said, may pass from the sewage.

to inquire whether our own habits are not in a great measure the responsible cause. Mr. Simon very pertinently asks why diphtheria, which scarcely had any place in history till it overrun Europe in the 16th century, and which, since that time, has again been but rarely mentioned, should for the last ten years have become an important disease in England.*

The answer is simply this—we have been careless as to the disposal of our excretions, and have been drinking water, or breathing air, contaminated by excretal matter, often in a state of decomposition. For details in proof of this, as regards diphtheria, I refer to the second report of the Medical Officer of the Privy Council, pages 167, 168, 171, 172; also to the eighth report, page 251.

Typhoid fever, killing from 15,000 to 18,000 every year, is another disease resulting from excremental pollution. I think I need not quote authorities to prove this, but I may refer you to the researches of all modern investigators of this disease, and especially to the reports of Mr. Simon, yearly prepared for the Privy Council. The origin of typhoid fever, from excremental pollution, is clearly proved in almost every volume of these valuable reports, either in the reports themselves, or in the appendices written by the various official inspectors.

In the last report, published a few weeks ago, I find that these inspectors had visited sixty-six places, but six must be deducted as double entries. In fifty, out of the sixty remaining cases, the occasion of the increased death-rate, which gave rise to the official inspection, was excremental pollution; in forty-nine of these the result was typhoid, and in sixteen scarlet fever, in the affected towns or districts. In most of these cases the water was befouled by excremental pollution, but as this as a source of disease is so well known, and has over and over again been so amply proved, I shall take it as granted, and dwell somewhat more in detail on another most fruitful source of typhoid fever, which is not so well known, and cannot be so easily guarded against.

A number of years ago I was able to trace several cases of typhoid fever to corroded soil pipes. At first I was very much puzzled as to the cause of this corrosion, but continued observation solved the difficulty.

I found that the perforations of the pipe were generally on its upper side, and therefore they could not be caused by the fluid passing through it. I also observed that the pipe most frequently affected was that leading from the closet to the main descending soil pipe, and that, wherever there was a bend in the tube, the upper surface became perforated. I have also sometimes found these perforations in the sides of the pipe as well.

The question here arises, how is this destruction of good, well made lead pipes effected? If we consider what part of the pipe it is that is destroyed, and also consider the result of chemical

* Eighth Report, 1865, p. 37.

analysis,* as well as the increased rapidity with which the destructive action takes place in pipes that are not ventilated, I think we are justified in coming to the conclusion that the destructive element is sewer gas.

If you will look carefully at the specimens, you will observe that the destructive action is from the inside. You will perceive that in some places the pipes are more or less eaten into, even where the action has not gone the length of complete perforation.

Of course, the discovery of these pipes in houses has only been in cases where I have been called professionally, and where the diseases were of such a type as we know can be produced by the inhalation of the results of decomposing excreta. (I may mention that as soon as the pipes have been removed, disease has ceased; notably so in an institution where, nearly three years ago, an outbreak of typhoid fever disappeared, and has not returned since the soil pipes were removed.)

The diseases I have observed, resulting from this condition of pipes, are typhoid fever, diphtheria, &c., &c., but in one or two cases I have had to remove families, all of whom were suffering from ill health from this poison, without exhibiting symptoms of any well defined disease.

In towns where w.c.'s have been extensively introduced, lead is generally used as the material of soil pipes, and as I now show you that these are liable to become imperfect, it is a very important sanitary question to inquire how long lead will last, in other words, what is the duration of a good lead soil pipe.

I have been attending to this matter for several years, and it is now more than four since I first publicly exhibited pipes like these; still I would not wish to speak dogmatically on the subject, as I think it requires further investigation. If I am correct in supposing that the destruction of the pipes is the result of gases, then the rapidity of the process will vary in different localities, as the sewage may be stronger or weaker, or passing more or less quickly into a state of decomposition. My researches, so far as they have yet proceeded, indicate, (1st) that where there is no ventilation, by the main descending soil pipe being closed at the top, not allowing the gases to escape, a lead pipe may in ten years become a source of disease, and possibly even earlier, if the sewers are faulty, promoting rapid decomposition of the excreta. If the sewers are good, well made, with a rapid flow of sewage, a non-ventilated pipe may last fifteen years.

When there is ventilation, the soil pipe being open at the top, and

* Analysis of whitish-brown powder from the interior of the perforated pipes.

Carbonate of lead	86·00	91·00	32·00
Carbonate of lime	2·00	2·10	2·90
Water	1·20	1·00	0·50
Lead insoluble as oxide	3·50	1·50	1·45
Silica	2·80	1·00	1·00
Organic matter	4·00	3·40	0·65

also acting as the rain water pipe, lead will last for twenty, thirty, or even more years. The practical conclusion to be drawn from this, in water-closet towns, is that where there is no ventilation you are not safe unless your soil pipes and connexions are renewed every ten to fifteen years, or every twenty to twenty-five where ventilation exists. Allow me to remark that we cannot trust the plumber to find out this condition of the pipes; they will probably only look for liquid leakage, and if they do not find it, they pronounce the pipes to be all right, and say that the smell we complain of must be caused by gas, dead rats, &c., &c.

In the most recent cases of disease (typhoid) from this cause which has come under my own notice, when I inquired as to the state of the drains, the lady of the house assured me that all was right as the w.c. had been renewed two months ago. Next day, however, perceiving an unpleasant smell, I requested that the plumber should examine the pipe from the closet to the soil pipe, as I was sure it must be perforated. I now exhibit the result. A year ago I was told that this state of pipes must be peculiar to Glasgow, and was in all probability occasioned by the refuse of chemical works passed into the sewers. Since then I have inquired into the state of several w.c. towns, and find in them all the same condition of pipes. I show you a specimen from Edinburgh where there are no chemical works. Should the cholera contagium get into the drains, we should have fearful havoc, wherever this defective state of soil pipes existed.*

Another group of diseases arising from excremental pollution, are the diarrhœal, including cholera. I need not, I think, insist that this last disease is the direct consequence of taking into our system the results of excremental pollution. Instead of going into any proof of my own as to this, I shall quote from the admirable and vigorous language of Mr. Simon. In the eighth report, p. 39, he thus writes—

"When cholera is epidemic in any place, persons who are suffering from the epidemic influence, though, perhaps, with only the slightest degree of diarrhœa, may, if they migrate, be the means of conveying to other places an infection of indefinite severity; that the quality of infectiveness belongs particularly, if not exclusively, to the matters which the patient discharges, by purging and vomiting, from his intestinal canal; that these matters are comparatively non-infective at the moment when they are discharged, but subsequently, while undergoing decomposition, acquire their maximum of infective power; that cholerine discharges, if cast away without previous disinfection,

* As the investigation of the causation of disease is carried out, I believe that the list already given of those diseases produced or conveyed by sewage will be increased. In two cases of phthisis, in people long past middle life, I could not attribute the disease to any other cause. The family history was good, the mode of living correct, and the general health satisfactory, up to the time of the soil pipes becoming corroded.

impart their own infective quality to the excremental matters with which they mingle, in drains or cesspools, or wherever else they flow or soak, and to the effluvia which those matters evolve; that if the cholera contagium, by leakage or soakage from drains or cesspools, or otherwise, gets access, even in small quantity, to wells, or other sources of drinking water, it infects in the most dangerous manner very large volumes of the fluid; that in the above-described ways, even a single patient with slight choleraic diarrhœa may exert a powerful infective influence on masses of population among whom, perhaps, his presence is unsuspected; that things, such as bedding and clothing, which have been imbued with choleraic discharges, and not afterwards fully disinfected, may long retain their infectious properties, and be the means of exciting choleraic outbreaks wherever they are sent for washing or other purposes."

Again, in ninth report, pp. 33 and 34, Mr. Simon thus powerfully writes:—"It cannot be too distinctly understood that the person who contracts cholera in this country is *ipso facto* demonstrated with almost absolute certainty to have been exposed to excremental pollution; that what gave him cholera was (mediately or immediately) cholera-contagium discharged from another's bowels; that, in short, the diffusion of cholera among us depends entirely upon the numberless filthy facilities which are let exist, and specially in our larger towns, for the fouling of earth, and air, and water, and thus secondarily for the infection of man, with whatever contagium may be contained in the miscellaneous outflowings of the population. Excrement-sodden earth, excrement-reeking air, excrement-tainted water; these are, for us, the causes of cholera. That they respectively act only in so far as the excrement is cholera-excrement, and that cholera-excrement again only acts in so far as it contains certain microscopical fungi, may be the truest of all propositions; but whatever be their abstract truth, their separate application is impossible. Nowhere out of Laputa could there be serious thought of differentiating excremental performances into groups of diarrhœal and healthy, or of using the highest powers of the microscope to identify the cylindro-tænium for extermination. It is excrement indiscriminately which must be kept from fouling us with its decay.

"The local conditions of safety are above all these two. (1.) That by appropriate structural works, all the excremental produce of the population shall be so promptly and so thoroughly removed, that the inhabited place in its air and soil shall be absolutely without fœcal impurities, and (2.) that the water supply of the population shall be derived from such sources, and conveyed in such channels, that its contamination by excrement is impossible." . . . . .

"It is to be hoped that, as the education of the country advances, this sort of thing will come to an end, that so much preventable death will not be always accepted as a fate; that for a population to be thus poisoned by its own excrement will some day be deemed ignominious and intolerable."

As regards diarrhœa, Dr. Greenhow reports, and Mr. Simon en-

dorses his opinion, that the deaths from this cause vary from four in every 100,000 of the population to 663 in the same number of the population.

He calculates that if the diarrhœal death-rate could be restricted in the whole of England to ten times the minimum death-rate, (namely, four) there would be a saving of 20,000 lives annually, and there would be a great reduction in the deaths from typhoid fever also. Both Mr. Simon and Dr. Greenhow are of opinion that the excess of mortality from these diseases has in all places been coincident with one or other of two definite local circumstances, (*a*) the tainting of the atmosphere with the products of organic decomposition, especially of human excrement—or, (*b*) the habitual drinking of impure water.

Before turning our attention to remedial measures, allow me to remark that water carriage was adopted in ignorance of the results that would flow from it. It was known that water oxidizes excreta, and it was supposed that we had nothing more to do than merely to pass these matters into streams to be rid of them—the result has simply proved that no river in the kingdom can oxidize the excreta of the towns on its banks. We have had our rivers rendered gigantic cesspools, and though many schemes have been proposed for the treatment of sewage, most of them have failed when brought to the touchstone of scientific research.

It is singular that so few plans have been devised to keep excreta out of the sewers, *i.e.* to have no sewage at all.

The plan of sewage irrigation has many advocates, and therefore I shall offer a few remarks upon it—for though it would in some degree utilize the sewage, it would not in the least improve the sanitary condition of w.c. towns. Its advocates assert that it will carry the excreta fresh to the soil, in refutation of which I shall simply advert to the case of Croydon.

I do so, (1st.) Because it is a very perfect specimen of sewage works carefully carried out under the most favourable circumstances. (2nd.) Because the advocates of sewage irrigation insist that the excreta ought to be carried fresh to the soil. (3rd.) Because the engineer tells us that the time from the closet, through the drains, through the draining beds—out again into the river—varies from a minimum of four to a maximum of six hours. If this is correct, it follows that at Croydon there should be no gas, it being a well-known fact that excreta takes at least twenty-four hours to decompose and give off gas.*

At Croydon, then, there should be no need of ventilation in the sewers, yet Dr. Carpenter, who highly approves of the system pursued there, tells us that from some mal-arrangement of the pipes in

* I wish it to be understood that I do not speak as to the present state of Croydon—I am dealing with a much larger subject—and merely quote Croydon as an illustration in point. I make this remark because when I used it on a former occasion I was misunderstood, and told that because Croydon is healthy now I had no right to refer to it.

his house, sewage gas passed into his house with a force resembling the escape of steam, and produced typhoid fever.

From this it is evident (1st) that the excreta are not passed on fresh to the land; (2nd) that it must take much longer than the theoretical time to pass from the closet through the pipes and over the meadows. I suppose the mistake may have in part originated in supposing that sewage matter will flow as rapidly through pipes as pure water, but if you have sewer gases at Croydon, with its recently and admirably constructed sewers, and their favourable fall, what will you have if you attempt sewage irrigation in towns, less favourably situated, where the drains are not nearly so well constructed, far more numerous and complicated, and where you might find it necessary to pump the sewage.

The most favourable circumstances for the decomposition of excreta are narrow spaces, with a limited supply of air and water; and if we would bring to the surface the whole network of the sewers of a large town we should find a very perfect laboratory for the production of sewer gas. These sewers often include old, irregular water-courses arched over, drains of larger and smaller dimensions, some round, some egg-shaped, and some square, I have no doubt still exist. At the bottom of most of these is a bed of black, thick, tenacious mud, and flowing over it a sluggish stream of various degrees of impurity, but slowly, silently, and continually giving off deadly gases. Sinking the sewers to their native and unsightly bed, let us look at the manner in which they are connected with our houses, by water-closets more or less perfect, and more or less out of repair, some of them being merely a tube passing into the drains without any pretence of a pan. We have also sinks and fixed basins in rooms, sometimes within a few feet of the bed. We are told to trap and ventilate the sewers, but by doing so in one place we only leave more gas to escape in another, indeed, it is but excluding a poisonous gas from our own house, which will find its way into our neighbour's, who may possibly not be so well protected from it. Sewer ventilation is not easy, and is very costly. Mr. Bazelgette estimates that to ventilate the sewers of London will cost 460,000*l.*, and for fuel per annum 201,480*l.*, exclusive of labour. Flushing with water would cost 381,250*l.*

Supposing that you have trapped your sewers, and carried a ventilating pipe to the roof, you have not destroyed the poison, but merely diluted it, and the contaminated atmosphere cannot but exercise an injurious effect more or less on the surrounding inhabitants. To show how slight a contamination of air will produce disease, allow me to mention a case that came under my own observation a few weeks ago. In a healthy rural district a youth was fishing for trout, and caught two. Exactly fourteen days afterwards (period of incubation) he was attacked by typhoid fever. His father, a highly intelligent and observant medical man, then recollected that close to the spot where his son had been fishing a sewer entered the stream, therefore, although the sewage was not strong

enough to kill the trout, the air was so tainted that its inhalation produced typhoid fever. I am myself a believer in the germ theory of disease, but without asking you to go this length with me, I ask you if I have not proved that certain diseases are produced by taking into our systems the result of the decomposition of excreta, and that several diseases may be produced by sewage. In these circumstances what ought we to do? If we had an epidemic of cholera, I have no doubt that every intelligent officer of health would at once direct that the stools of all patients should be disinfected, but probably before this order could be carried out the mischief would have been done. Let us educate the people to this beforehand, and we shall at the same time get quit of the risk of causing or conveying other diseases.

I hold that the only true sanitary solution of our difficulty is to provide that there shall be no decomposition of excreta, that the sewers shall be for the rains, and that all excreta shall be disinfected, the progress of our knowledge of what we call antiseptic chemistry rendering this less and less difficult.

We may, then, sum up as follows :—

(1.) No excreta shall be allowed to get into our sewers, water-courses, or rivers.

(2.) That all such excreta be submitted to chemical or other action, by which they shall be rendered non-putrescible.

(3.) That all refuse from manufactories containing organic nitrogen and carbon (putrescible matter) shall be kept out of our sewers, water-courses, and rivers.

As regards this last particular we would require an Act of Parliament to prevent manufacturers passing organic refuse into the sewers. A profitable return might probably be the result. Mr. Smith tells me, that from one work 500,000 gallons a week are passed into the sewers, each ton of which is worth 3*s.* 6*d.* As regards the 1st and 2nd particulars I may remark that my own individual opinion inclines in favour of the dry system, but provision must be made for those towns in which water-closets are already established, and where the inhabitants would be unwilling to part with them. I would propose that they should adopt the apparatus of Mr. Hoey, a model of which is here exhibited.

The principle of it is that the flush pipe shall be fed from a limited cistern containing one-fifth of a gallon, and that when the pan is discharged, a quantity of sulphuric acid, common salt, or some other antiseptic shall be discharged with it.

The whole matter must be passed into a tank or reservoir under ground, from which it will be removed by atmospheric pressure.

The advantages of the system are obvious; (1st.) It leaves the w.c.'s as they are, and saves an enormous amount of water. (2nd.) As the added antiseptic will prevent the fœcal matter from putrefying, there need be no fear of sewer gas getting into our houses, or fœcal percolation through the soil into our wells, and we would cease to suffer from the diseases produced by these causes. (3rd.) It is not expensive, and can be as easily worked as the ordinary water-

closet. (4th.) The collected matter, after the evaporation of the water, would be a valuable manure.

As an experiment I had a closet of this description fitted up in my own house about two years ago—I find that it works admirably, being quite as clean and well flushed as two other closets in the same house where the supply of water is unlimited.

Of the dry systems, you are all acquainted with Mr. Moule's earth-closet. A grand improvement on it is Mr. Stanford's carbon-closet, but as a paper is to be read on it I shall reserve my remarks, merely observing that in every respect it meets the requirements of sanitary science.

As I have already exceeded the time allowed for voluntary papers, I must not enter on the consideration of the other diseases produced or conveyed by sewage. I merely append a table of deaths from zymotic diseases, most of which may pass from sewage.

TABLE showing the NUMBER of DEATHS in England from certain ZYMOTIC DISEASES in each year for which the record has been made from 1838 to 1868.

Years.	Scarlatina.	Diphtheria.	Measles.	Hooping Cough.	Small-pox.	Fever.	Diarrhœa, Dysentery & Cholera.	Total.
1838	5,802	—	6,514	9,107	16,268	18,775	3,440	59,906
1839	10,325	—	10,937	8,165	9,131	15,666	3,493	57,717
1840	19,816	—	9,326	6,132	10,434	17,177	4,799	67,684
1841	14,161	—	6,894	8,099	6,368	14,846	4,198	54,566
1842	12,807	—	8,742	8,091	2,715	16,201	7,622	56,178
1847	14,627	—	8,630	9,260	4,227	30,094	15,630	83,498
1848	20,502	—	6,867	6,862	6,003	22,057	15,004	78,775
1849	13,111	—	5,464	9,615	4,645	18,347	74,155	125,337
1850	13,370	—	7,080	7,770	4,666	15,375	14,400	62,661
1851	13,594	40	9,370	7,905	6,997	17,930	18,045	73,881
1852	18,813	74	5,846	8,022	7,320	18,641	21,754	80,470
1853	15,633	46	4,805	11,200	3,151	18,554	20,502	74,001
1854	18,325	203	9,277	9,770	2,808	18,893	42,092	101,368
1855	17,128	186	7,354	10,185	2,525	16,470	13,044	68,892
1856	13,931	229	7,124	9,225	2,277	16,182	15,912	64,880
1857	13,919	310	5,969	10,138	3,936	19,016	24,037	77,325
1858	25,481	4,836	9,271	11,648	6,460	17,883	16,004	91,583
1859	19,907	9,687	9,548	8,976	3,848	15,877	20,597	88,340
1860	9,681	5,212	9,557	8,555	2,749	13,012	11,185	59,951
1861	9,077	4,517	9,055	12,309	1,320	15,440	29,999	72,717
1862	14,834	4,903	9,800	12,272	1,628	18,721	12,967	74,825
1863	30,475	6,507	11,349	11,275	5,964	18,017	16,801	100,388
1864	29,700	5,464	8,523	8,570	7,684	20,106	18,366	98,213
1865	17,700	4,145	8,562	8,047	6,411	23,034	25,894	94,393
1866	11,685	3,000	10,940	15,764	3,929	21,104	32,644	98,166
1867	12,300	2,600	6,588	11,873	2,513	16,862	21,735	74,471
1868	21,912	3,013	11,630	9,223	2,052	19,701	32,427	99,958

GENERAL SEWAGE AND MANURE COMPANY, LIMITED.

AN ADDRESS,

DELIVERED BY

DR. ANDERSON,

On the occasion of the first Official Visit of the Directors of the General Sewage and Manure Company, Limited, to the Works, at Nuneaton,

ON THURSDAY, JUNE 20TH, 1872.

BIRMINGHAM:
THE "JOURNAL" PRINTING OFFICES, NEW STREET.

ADDRESS.

My Lord and Gentlemen,—

Occupying as you do the position of Directors of the General Sewage and Manure Company, you no doubt have been asked, and will be asked, many questions in connection with the great *vexata questio* of the day as to the disposal and treatment of sewage, and I should like to take this opportunity of saying a few words on the subject generally, and of our own process particularly. The whole question is a difficult one, and I want to point out to you some of the difficulties, and to show the remedies that I propose for these difficulties.

Let me first ask you to glance at what has been done, and is now being done, in the matter, and at the various schemes which are now before the public. There have been of late years three Royal Commissions appointed to report on the Pollution of Rivers, and to suggest a remedy for the evil. All these Commissions have run in the same groove, having one and all recommended irrigation as the best way of disposing of the sewage; but from this recommendation I beg to differ; and if there was a canvass on the question I am confident that the majority of the public, especially the landowning public, would be on my side. I have care-

fully looked over the reports of the two last Commissions—I won't say I have read all their tables, for I think few men would willingly go through such an undertaking—and the conclusion I have arrived at is that their reports are founded upon wrong data. They have produced some very elaborate tables, and propounded some very elaborate theories which have served no purpose but to lead to angry discussions amongst literary and scientific men on various occasions. Let me try to explain what I mean by such a statement. Sewage is a complex material, consisting of the scourings of the streets, refuse from water-closets, waste matter from kitchens, wash-houses, slaughter-houses, manufactories, and various other sources; so that it contains a miscellaneous collection of all sorts of waste matter, not only varying at different times of the day, but different days of the week, and differing in each town from that of any other. In estimating a complex fluid of this sort, you will understand the difficulty of arriving at anything like a general average; yet the second report of the Commissioners contains the following statement, which appears in the report of the Commission published in 1865, at page 33—namely, that, the "solid matter discharged by the sewage of London in one "day is calculated to amount to 250 tons." Now, consider for a moment what this statement means. Taking the population at three millions—which I should think is below the number really using the sewers—this statement means that the average daily contribution of each individual is only between one-fifth and one-sixth of a pound, the exact quantity being 1,306⅔ grains; or, to put it in another way, it means that, presuming the sewage of London to average 40 gallons per head per day, each gallon of sewage only contains about 23 grains of solid matter. If sewage contained no larger quantity of impurity than this, there would not be the present general outcry about the nuisance.

The Commissioners, in their recent report, make various allusions to what they term the average strength of sewage of various towns; I should like very much to know how they arrived at their conclusions as to this average. From

the way in which they conducted their experiments at Leamington in their investigations on the A B C process, and the way in which they collected samples to obtain what they considered the average of the sewage under treatment (supposing this to represent the general plan of proceeding), I very much question the accuracy of their statements. From a careful perusal of their report, their plan of procedure seems to have been this—to have collected at regular intervals, say every half hour, a quantity, say one pint, of sewage, and at the termination of a definite time, say 24 hours, to have all these samples mixed together, and by taking a portion of the whole to have called this an average sample. Experiments conducted in this way cannot but lead to wrong conclusions, for this reason: Sewage not only varies at every hour in the day in quantity and in foulness, but when at its foulest the flow is greatest; so that in order to arrive at anything like a fair average the sewage flow should first be gauged, and then a proportionate quantity taken at different times in relation to the flow. I have frequently seen the sewage of Coventry flowing in the middle of the day, and gauged it at the rate of four million gallons in the 24 hours, loaded with filth of all kinds; while in the early morning I have seen it clear and colourless, and only flowing at the rate of half a million gallons in the 24 hours. These are some of the errors into which I believe the Commissioners to have fallen—errors which I believe to have arisen not from any intentional error or lack of diligence on their part, but simply from the difficulties which beset the way they were obliged to approach the question. Samples of sewage collected at the outfall, and analysed at the expiration of perhaps three weeks after collection, do not represent the original sewage. The ingredients that enter into the composition of sewage undergo in time a material chemical change. Fresh sewage is comparatively free from unpleasant effect. It is the decomposition of sewage that makes it a nuisance. Many of the insoluble ingredients may, in fresh sewage, be removed, but if allowed to remain, undergo decomposition and form deleterious and soluble compounds;

nitrogenous matters become converted into ammoniacal salts, and various other changes take place. In the whole report too little stress is laid upon the removal of the insoluble matter from sewage, whereas, by its removal in a fresh state, I am convinced that a great deal of the subsequent decomposition, and consequent pollution of the sewage, may be arrested. Most of the analyses of sewage published by the Commissioners, show that these decompositions had already set in; for an examination of their analyses show a large precentage of ammonia in comparision to organic nitrogen, which means simply this—that the sewage had been kept a sufficient time to allow of the conversion of the nitrogen into ammonia. Compare the analysis of sewage that I have already published with the analyses of sewage published by the Commissioners, and let me draw your attention to these points—viz., that the analysis I give shows a larger percentage of organic nitrogen than any analysis of the Commissioners; whereas the quantity of ammonia is smaller in my analysis than in any single analysis of raw sewage given by the Commission, the interpretation of which is that my sample of sewage was a very foul one, but was analysed before any great changes in the chemical nature of the sewage had taken place; whereas all the analyses of sewage given by the Commission show that the sewage had been kept a long time, and had naturally changed in character. These are some of the grounds upon which I object to the data upon which their report is founded.

Let me now shortly glance at the recommendations which the Commissioners hold out to remedy the evil. Their recommendations point principally to irrigation as the solution of the sewage difficulty, and they quote various places as illustrations of the success of this plan. Let me just point to the difference of opinion expressed by the Commissioners, and by scientific men unconnected with the Commission, and try to reconcile the different statements made. In the Commissioners' work appear reports on Aldershott, Banbury, Warwick, Croydon, Edinburgh, and other places. Dr. Letheby, in his recent work on sewage, also gives a report on these

same places. Let me on one side put the Commissioners' report, and on the other Dr. Letheby's:—

ALDERSHOTT.

The Commissioners.

In this case the extreme natural poverty of the soil does not seem to have been a hindrance to the efficiency of cleansing by irrigation. The farm, well managed, is covered with a capital plant of vigorous growth, to be fed by the filthy water, which accordingly is gradually purified by the process.

Dr. Letheby.

At the time of our visit the farm was in a very offensive condition; for although the great bulk of the sewage was not flowing upon the land at all, but running bodily into the black water stream, yet the remains of previous irrigation were laying about in cakes of partially dried fœcal matter, which would be washed away into the nearest streams and ditches by the first heavy shower of rain. The ground, in fact was everywhere sodden and stinking, and the rye grass was dying out, and the usual rank water grass taking its place.

BANBURY.

The Commissioners.

The sewage is collected in tanks, where the settling takes place, and the liquid part is delivered over the irrigation farm, where it is satisfactorily purified. The accounts given of the produce of the land are satisfactory, and it is believed the farm will soon repay rent and costs and loan; so that the nuisance hitherto created by the town will be abated without any serious charge to the inhabitants.

Dr. Letheby.

At the time of our visit the ground was sodden with sewage, and the side ditches were full of decomposing sewage, the smell from which was very offensive. Last year the returns were £160 less than the expenses and interest of money. The farm therefore is, to that extent, a losing affair, and the sanitary results are most unsatisfactory. The town, as usual, is glad to have a respite of its legal difficulties under any pretence, but assuredly the question of fouling the river is as far from being settled as ever it was.

WARWICK.

The Commissioners.

There are difficulties here owing to the low and flat nature of a portion of the farm, and consequent difficulties in keeping the land at wet seasons properly drained. Nevertheless the nuisance is sufficiently abated, and large crops of Italian rye grass have been grown. The farm must, we understand, pay at least £1,600 a year to replace the costs which the town has already incurred in respect of rent, pumping, &c.

Dr. Letheby.

The farm was in sad plight at the time of our visit, for the winter frost had killed the grass upon large portions of the fields, and the sewage was running over the ground in a very offensive state. The land is composed of stiff clay, and in summer time, when the clay cracks, the sewage soaks into the ground and reaches the subsoil water without undergoing the least purification, and in winter time it flows bodily over the soil, and discharges itself into the outfall in the same condition as it reaches the farm. Last year the produce just paid working expenses of the farm, without interest of money or cost of superintendence.

CROYDON.

The Commissioners.

The usual successful account of irrigation as a commercial undertaking and purifying process is given.

Dr. Letheby.

The land is at all times in a sodden and offensive condition, and according to the evidence of Mr. Creasy, who practices as a surgeon in the neighbourhood, and of Mr. Smee, who has a garden in the neighbourhood, the smell is sometimes most sickening. Typhoid fever is nearly always present in the houses about the farm, and all diseases assume a typhoid form —with a sewage tongue. At Beddington the sewage is very weak, and the action of the land sufficiently purifies it to render it admissable into a running stream, but at Norwood the effluent water was in a very unsatisfactory state.

EDINBURGH.

The Commissioners

Make excuse for the offensive state of the Edinburgh meadows by stating that irrigation here is not made use of as a means of purifying the sewage, but simply as a commercial undertaking.

Dr. Letheby.

These meadows have long been notorious as the most filthy and offensive plots of cultivated ground in Great Britain. They are also remarkable for their so-called extreme fertility in producing the largest produce of a coarse, rank, and washy grass, which, like brewers' grains, is only fit for the food of milch cows pent up in the close sheds of a town dairy, where quantity and not quality of milk is the desideratum. The sewage as it passes through the meadows is distributed upon them in the most profuse manner, rendering the ground a swampy sewage morass; in fact, the effluent water which runs off in many channels and trickles away to the sea-shore is as foul as it can well be. The smell from the open burn and the swampy meadow is so powerful that it is offensive to the whole neighbourhood. At the time of our visit to the meadows in 1866 there were acres and acres of the grass rotting upon the ground, because the cattle plague had killed the cows and the demand for such fodder had ceased. The sewage, therefore, was running away to the sea by its natural channel, and the ground was almost entirely abandoned. We had great difficulty in finding the man who had charge of it, and he told us they would gladly give the grass to anybody who would cut it and carry it away, and that during the year they did not realise over £7 an acre for even the best plots of the ground.

Such contradictory statements as these might lead one to suppose, and very reasonably, that either the Commissioners or Dr. Letheby were mistaken in their facts. I think I can offer an explanation which will allow that both arrived at their conclusions from what they actually saw. Nothing in the world is easier than to purify sewage over a large area of land—that is, temporally; but after a time the land becomes sodden, and the purifying agency of the land ceases. Any manager of an irrigation farm who had previous notice of the advent of a Royal Commission, would take very good care to have his farm in a perfect state for inspection, and would be careful that the sewage was thoroughly purified during the visit of the Commission. They (the Commission) would judge by what they saw, and fancy that the same state of things existed every day. Speaking from my own experience of irrigation I have no hesitation in saying that it cannot be carried on, except over a very large area of land without creating a great nuisance, and as regards the probable commercial success of the undertaking, judging of it even from the reports of irrigationists themselves, or judging from the report of the Commission, I challenge any one to show me a single instance of a commercial success. As I pointed out in a pamphlet I wrote some few years ago, no one, in giving an account of irrigation, and in giving a debtor and creditor account of irrigation farms, attaches the least value or puts any price upon sewage as a manure. In all the accounts this item is ignored altogether, whereas if it were valued at even the lowest theoretical or commercial valuation, the enormous quantities of sewage which are used upon irrigation farms would add a material sum to the expenses of farming. In one or two instances the advocates of irrigation claim success for this plan, as at Mr. Hope's farm, but in these cases large capital has been invested in the preparations of the land, and a sum of money is paid for the delivery of the sewage upon a certain spot on the farm, the farmer paying a sum for the sewage which costs somebody else four or five times as much to give him, and neither party putting the least intrinsic value upon the sewage. Leamington has now for some

months past delivered by such an arrangement this sewage upon Lord Warwick's farm; he (Lord Warwick) paying £400 a year for the sewage when delivered. The works cost the Local Board £22,000, and their current expenses are £700 a year, so that the town, for interest of money, repayment of capital, &c., is saddled with an annual expense of about £1,500 a year; and from what I hear, I must doubt whether the question of abating the nuisance is settled even at this cost, as I heard from one of the Local Board a few days since that there are complaints about the state of the river. In a sanitary point of view, some grave objections may be urged against irrigation. On these I will not dwell for any length of time, but will merely point out what they are, and state that the evidence is conflicting. Up to the present time, luckily for the general sanitary condition of the kingdom, the sanitary objections to irrigation are almost theoretical, and I hope that irrigation may never be so universally adopted as to admit of the truth of these theories being refuted or affirmed. Speaking as a medical man, I have not the least doubt that irrigation in case of an epidemic of typhoid, would be the means of spreading the disease to an alarming extent, by carrying the typhoid germs into drinking wells in the neighbourhood of irrigated lands. Dr. Cobbold has expressed an opinion that irrigation extensively applied will be very apt to increase tape-worm in the human subject, and produce other injurious effects upon mankind, by injuring the flesh of animals fed on sewage grass. There is no doubt that if sewage be run on land for any length of time the surface wells in the neighbourhood of that land are liable to be contaminated, and that injurious effects will be produced if people use the water of such wells for domestic purposes. Although in this country we have not yet had very large opportunities of arriving at a knowledge of the nuisances arising from irrigation, we have ample testimony on the subject from those who have seen it extensively practised abroad. Anyone who has been in China is perfectly ready to testify to the beastly condition of the general country, which is solely owing to sewage irrigation.

As regards the purifying effect of irrigation on sewage, we have the testimony of Dr. Letheby as to its inefficiency, and even taking the Commissioners' own report as evidence of the purifying effect of irrigation, the result is by no means satisfactory. Out of six towns mentioned by the Commissioners, for which six towns they gave ten analyses of sewage and effluent water, five of these analyses do not come up to the standard of purity laid down by themselves, and of the remaining five two only just fulfil the necessary conditions of purity. Let me here just say a few words about the difficulty of accepting any particular chemical standard of purity, and about the standard proposed by the Commission.

The Commissioners, in their report, have laid down a standard of purity, and have recommended that any liquid which does not come up to this standard should be deemed polluting, and should not be admissible into a running stream. The list of polluting substances is divided into 9 or 10 heads, and the classification is dependent upon the chemical nature of the polluting substances; but except five manufacturing places, the first three are the only tests of pollution that need be considered. These three are—

(a) Any liquid containing in suspension more than three parts by weight of dry mineral matter, or one part by weight of dry organic matter, in 100,000 parts by weight of the liquid.

(b) Any liquid containing in solution more than two parts by weight of organic carbon, or three parts of organic nitrogen, in 100,000 parts by weight.

(c) Any liquid which shall exhibit by daylight a distinct colour, when a stratum of it one inch deep is placed in a white porcelain vessel.

The tests under *a* and *c* are practical and easy of application; those under *b* are scientific and theoretical, and their value doubtful. Let me try to explain my meaning to those

among you who have not made a special study of chemistry. A perfect and reliable test for the quantity and character of organic matter is unknown to chemists; until within the last few years the quantity of organic matter was determined by evaporating to dryness the suspected liquid, and then burning at a red heat the residue, having accurately weighed the residue after drying and burning, and putting down the difference in weight as representing organic matter. This plan is open to objection, inasmuch as various substances are driven off at the same time as the organic matter, such as carbonic acid from the carbonates and nitric acid from the nitrates, &c. These substances are generally present in sewage, and their presence would lead to erroneous conclusions. As an instance of this I will mention that the Report of the Commission in 1865 shows the effluent water at Rugby to be, in some instances as foul, in others more foul, than the sewage before treatment. (See page 71 of Commissioners' Report, 1871.) This error the present Commission have pointed out, but it is an open question whether their suggestions offer any better test. They (the Commissioners) state that, although it is not practicable by any known means to ascertain accurately the quantity of organic matter in any suspected liquid, yet that it is perfectly practicable to determine the quantities of certain elements of organic matter (nitrogen and carbon), and by their determination to infer the character of organic matter. I doubt the accuracy of this plan just as much as the other, and consider it just as likely to lead to erroneous conclusions. Ultimate analysis, especially of organic substances, has been long looked upon with great suspicion by chemists; yet the Commission propose to resort to it to prove their case. Let me try to put this plainly before you. All the thousands and millions of different forms of organic matter consist of four principal elements—oxygen, hydrogen, nitrogen, and carbon. Some of the substances into the formation of which these elements enter act as deadly poisons; others, consisting exactly of the same elementary bodies, are necessary for our daily sustenance. No chemist lives, or ever has lived—I may go further, and say

ever will live—who by the determination of any one of these elements can pretend to say whether a substance is food or poison. Neither of the elementary bodies selected by the Commission is in itself injurious: both nitrogen and carbon are essential ingredients of our food. I am quite ready to admit that their presence in water in certain quantities is evidence of the impurity of that water, but not of this degree of impurity, and I cannot recognise the necessity of laying down any scientific standard of purity of this nature. The character and chemical composition of the germs of certain diseases are quite unknown: these may unquestionably be conveyed by sewage—the choleraic and typhoid poisons for instance. We know of their presence by the effect produced, as where a family suffers from typhoid fever, and on enquiry it is found that the well from which their water supply is obtained is in the vicinity of a cesspool into which the excreta of another family are conveyed, some one or more members of whom have previously suffered from typhoid fever. On evidence such as this we are justified in concluding that the water is charged with the poison germs, but we cannot by any scientific tests detect or practically show their existence; it is only by their physiological effect that we infer their existence. The adoption of any such scientific standard as that proposed is, in my opinion, calculated to do mischief, for, on the one hand, sewage might often be found which did not come up to this standard, and was yet perfectly harmless; and on the other hand, sewage might be found which did come up to the standard, and yet contained the deadly germs of choleraic or typhoid poisons. For all practical purposes the old method of determining the existence of organic matter is as useful as the new, while for accurate analysis neither the one nor the other can be depended on; and I cannot see the necessity for the adoption of any such standard, for the evidence of our own senses is quite enough to show whether sewage after treatment is likely to prove a nuisance or not. Absolute purity, as regards water, is unknown in nature; if any standard of purity is laid down by law, limiting the quantity of organic matter, there will be

very great difficulty in carrying out such law, owing to the difficulties that beset the determination of organic matter. I speak in this way under the impression that it is a dangerous doctrine to hold, that sewage can by any known means be purified to such an extent and with such certainty as to render it fit for domestic use. All water for drinking purposes or domestic use ought, like Cæsar's wife, to be above suspicion, and the water supply of all towns ought to be derived from some pure and undoubted source, and not from the nearest river, in order to save money. I am afraid that I have tried your patience by dwelling so long on this part of the question (the Commissioners' report), but I think you will see the necessity of my so doing. There is a tendency on the part of most people to accept as true statements which are made under official authority, and in combating with such statements I have felt it only right and fair to you to give my reasons for entertaining different opinions.

There are various processes before the public for the precipitation of the impurities of sewage; into the merits of these different plans I will not at present enter, but shall be very happy to throw down the gauntlet to one and all of them in a friendly way, and try conclusions on the important grounds of economy in conducting the process and efficiency of result. There is plenty of room for all processes fairly conducted, and our time will be better occupied in considering in detail our own process than in criticising rival schemes.

The agent that I make use of, as you are all aware, is sulphate of alumina, in a crude form, in conjunction with lime. The mode of manufacturing the crude sulphate I have explained to you to-day, and my reasons for using the agent in this crude form are entirely economical. The objects to be aimed at in the use of any salt of alumina are to obtain, at the smallest cost, the largest quantity of alumina, and to use the salt in such a way as to obtain the best results as regards defecating effect. Both these desiderata I claim to obtain. The salts of alumina have long been known to chemists as possessing a strong affinity for certain forms of organic and colouring matter, and alum has from

time immemorial been used as a mordant by dyers, and has been also proposed as a defecater for sewage. The effect of alum or any aluminous salt is in proportion to the quantity of basic alumina it contains, and a salt of alumina which contains a large per centage of the active ingredient alumina must be preferable to another salt with a smaller quantity, if the former can be produced at a cheaper rate. Now alum contains only 12 per cent. of alumina, and costs about £8 or £10 per ton, whereas the material that I use contains from 20 to 25 per cent. of alumina, and costs only £2 per ton. There is a commercial sulphate of alumina, but this material cannot enter into successful competition with my agent, as it contains a quantity of water of combination, which quantity varies in different samples, but on the average does not yield a larger per centage of alumina, and costs £6 10s. to £7 per ton. The crude sulphate of alumina, as I use it, contains about 40 or 50 per cent of sand, and a well dried commercial sulphate of alumina, about the same quantity of water of combination, so that in point of effect, weight for weight, they are of equal value, but in point of cost there is the difference between £2 and £7.

As regards the method of using the salt, the great point to bear in mind is that the best effect is produced when the alumina is presented in the state of minute subdivision. No amount of mechanical crushing or pounding can equal the state of minute subdivision that obtains when a substance is in solution,—this is the reason that I use alumina as a soluble salt. If, when in solution, that is, when evenly distributed throughout the sewage, the active ingredient, alumina, be separated as an insoluble precipitate, we have here the best means of bringing into contact the finely divided flocculent alumina and the organic matter contained in the sewage. It is with this object that I use lime. As I use it, I do not mean the lime itself to act as a defecator, but its simple use is to combine with the sulphuric acid of the sulphate of alumina, and set free the alumina. This, and this only, is the defecating agent I depend upon. The insoluble sand

which exists in my compound may, previously to use, be removed, but its removal is attended with some trouble and expense, and as sewage already contains so much rubbish, I do not think that the addition of a little more will materially affect the value of the manure. This, however, I look upon as a matter of practical detail, and in some towns I should recommend the removal of the sand, in other towns I should not remove it.

You will have noticed in your visit to the works to-day that I empty each tank every time after treatment. I think this is a matter of great importance, and I am not aware that it has before received attention. The precipitate of alumina and organic matter is so light and flocculent that perfect rest is necessary for obtaining the best results; besides this, the precipitated mud is itself ready to undergo decomposition, and after a short time to set up secondary decomposition in the purified sewage. The draining and drying apparatus you have had the opportunity of examining for yourselves; up to the present time this has been the difficult part in plans of precipitation, but this difficulty by my plan I am very sanguine of overcoming. You have also seen the purifying effect of my agent, and had opportunities of inspecting the effluent water and comparing it with the raw sewage. In a short time, directly I can arrange for the purchase and preparation of the land, I shall be able to show you the effect of intermittent filtration in conjunction with my process of precipitation. The additional improvement that I hope to be able to effect by this plan is this: Sewage, as you are aware, consists of dissolved and suspended impurities; all the latter and some portion of the former are removed by alumina, but there are certain forms of dissolved organic matter which are not removed by any known process, either of precipitation, irrigation, or filtration, the chief of which is urea. Although this substance cannot be removed, it can however be converted into a harmless body, ammonia or its carbonate, by exposure to the atmosphere. I propose to use a small quantity of land simply as an oxydizing medium, and for this purpose propose to double dig and drain it thoroughly,

so that the pores of the land may contain as much air as possible. Through this land I propose to pass the effluent water, with the object of bringing it freely into contact with atmospheric air. The urea will become converted into carbonate of ammonia, which will be dissolved and carried away in the effluent water; so that no work will be thrown upon the land which will in any way clog or choke it. The sole action of the land will be to retain air, and all that will be necessary to restore its power when temporarily exhausted will be to re-dig, and allow it to rest. One or two acres of land properly prepared may in this way be used alternately, in plots, so that there will always be a portion of land ready for the reception of effluent water. This loss of urea, whether in the form of urea or ammonia, is the weak point in all plans for treating sewage. I know of no plan which renders it wholly available. There is a great loss under irrigation; for supposing the land to be able to retain it as ammonia, owing to the property of the soil for fixing it (which property is in proportion to the alumina it contains in the shape of clay), the greater part of such ammonia, owing to deep drainage, is beyond the reach of the plant roots, and might as well for all useful purposes be in the next field, or nearest water course. But I doubt the retention of ammonia by soil under such repeated and copious washings as irrigation bestows. Again, the returns of produce under irrigation, for the quantity of manure used, show a vast loss of manure somewhere, as the crops seldom approach in value the quantity of manure used. I know that some profess to be able to remove urea by filtration, but I have never been able to succeed in doing it in a practical manner, as applicable to sewage, and I have never seen or heard of anyone who had really succeeded in doing it

Notwithstanding all that has been said and written on the subject, this difficult sewage question still remains unsolved. Let us try and help towards its solution. I am convinced that any successful plan must depend for success upon proper and judicious mechanical arrangements, that the assistance of the Engineer is as necessary as the help of the Chemist, and

that, with properly arranged and well managed works, it is perfectly practicable to treat sewage successfully so as to obviate nuisance, produce a good effluent, and at the same time derive a good and substantial profit. In such a great question, and where there is such a diversity of opinion, it is unreasonable to expect every one to be on our side. We have our friends and foes. After we have been honestly at work at Nuneaton for some little time, I hope our friends will rally round us in such numbers as to allow us to forget our foes and we shall then make the General Sewage and Manure Company a great success.

GENERAL SEWAGE MANURE COMPANY LIMITED.

[From the *Bristol Times and Mirror*, July 6th, 1872.]

We understand that a deputation from London waited on the Committee of the Local Board, in Queen Square, on Thursday, on the important question of what is best to be done with the sewage of this city when its drainage works are completed—shall it be utilised, or shall it in the future, as in the past, be allowed to be passed into the river, and so return again and again as a local poison in the waters? We hear that Dr. Anderson, of Coventry, the patentee, was present, and a supply of sewage from the mouth of one of the city sewers having been brought to the office, the gentlemen then sitting at the Board witnessed the process. Five gallons of the filthy material were placed in a clear glass vessel, and the Anderson chemicals having been supplied, and the whole well stirred together, the sewage in a few minutes began to combine with the sulphates, and gradually to sink to the bottom of the vessel. In less than half-an-hour the liquid had, from foul sewage, become translucent and free from smell. We understand the committee were highly pleased with the experiment shown them, and expressed an intention to visit the works of the company at Nuneaton, where, it will be recollected, a large number of *savans* and the press were gathered together to see the process exhibited on 250,000 gallons of sewage about a fortnight ago, and which was then reported on most favourably. We may therefore trust to this great and vital question of sewage being fairly on the way of scientific and commercial reduction. We regret that we were not present on Thursday, but we understand the meeting was hastily and not officially arranged. We shall, however, look with interest to the result of the visit to Nuneaton.

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REMARKS

ON

MR. CLARK'S CALCUTTA DRAINAGE SCHEME.

[BEING PART OF A DISCUSSION WHICH TOOK PLACE AT A MEETING OF THE BENGAL SOCIAL SCIENCE ASSOCIATION, IN THE TOWN HALL, CALCUTTA, ON SATURDAY THE 25TH MARCH 1871.]

BY

DAVID B. SMITH, M. D.,

SANITARY COMMISSIONER FOR BENGAL.

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REMARKS

ON

MR. CLARK'S CALCUTTA DRAINAGE SCHEME.

Mr. Chairman and Gentlemen,

I am glad to have the opportunity of being allowed to make a few remarks on Mr. Clark's Drainage Scheme, because I feel sure that all who have paid any attention to the subject must allow that it is one of the very highest importance to the interests of the people of Calcutta. The fact noted by the Chairman, that Native Society is in a state of agitation on this subject, goes to prove that some interest is taken in the question—how best to get rid of the impurities of this City.

Gentlemen, I have devoted a good deal of time and attention to Mr. Clark's scheme,—perhaps more than most of you here present; and, therefore, I am anxious to lay my opinions before you plainly, impartially, and without any desire to exaggerate, or to be unnecessarily controversial. Mr. Clark himself has allowed, in writing, that I have "evinced an honest endeavour to ascertain the real merits of his scheme," and that I have "made it the subject of strict and unprejudiced enquiry." My opinions on this subject are easily summed up. They are already in print, and fully set forth in a Report (on "the Drainage and Conservancy of Calcutta"), which was pub-

lished by the Government of Bengal, about two years ago. To the opinions therein expressed I still, for the most part, adhere. Briefly put, they are somewhat as follows: (*a*) Mr. Clark's scheme is a great improvement on the old state of things; (*b*) it ought to be completed; (*c*) its chief defects seem to me the following:—it would be better if solid excreta were not removed with the drainage; (*d*) the present condition of the outfall is highly unsatisfactory.

I will, if you will allow me, make a few remarks on each of these points separately:—

(*a.*) Mr. Clark's scheme is a great improvement on the old state of things. If we wish to see what the old state of things was, we have only to go to the northern portions of Calcutta,—for example, to the narrow streets at the back of Chitpore road. There we see every kind of abomination, and it is scarcely too much to say that the laws of cleanliness and of health are violated at every turn. Moreover, the system of conservancy there adopted is very inefficient.

Allowing then that the northern parts of the Town are very filthy, I can scarcely understand the Natives, particularly Native gentlemen of education, in any way resisting reasonable propositions for its improvement.

As a *Drainage* Scheme (I purposely omit the question of *Sewage* at present), I say, without any misgivings, that I believe Mr. Clark's project will prove very effective, and worthy of his high reputation as a well-known and eminent Engineer.

Experts of undoubted authority have approved of it as an Engineering work. It would, therefore, ill become me to criticize it from this point of view. I have no wish to do so. But it is not merely a Drainage Scheme. It is a

Sewerage System,—*i. e.*, it takes away ALL the refuse of human habitations, and not only the water of drainage and of rain-fall. It is, therefore, not right to speak of Mr. Clark's scheme as one of *Drainage* only. It is much more than this; it professes to be the most complete kind of Sewerage. It is very important to bear this in mind. Even although the Drainage project has been approved by highly competent authorities, there is no reason why it should not be discussed, from different points of view, at a meeting like the present. It is truly said that free discussion never hurts a good cause.

I particularly desire to say that any remarks I make on the present occasion are intended simply as fair criticism of the subject before us, and not in any way as pleadings in behalf of foolish prejudice and obstructiveness.

The most important result of Mr. Clark's work will, it appears to me, be the *sub-soil drainage* of Calcutta. On this subject I wrote as follows two years ago:—

I regard this as the conspicuous merit, in a hygienic point of view, of Mr. Clark's scheme.

If it accomplished nothing but this—*the sub-soil drainage of Calcutta*—it would be worth all the money that has been or is likely to be expended on it. When this is achieved, it will be quite an era in the history of Indian sanitation.

The vast importance of sub-soil drainage is proved by the following extract from a very able Report published in 1865 by the Council of Hygiene and Public Health at New York:

"In three of the badly drained districts, noted for their insalubrity, a series of *hygrometrical observations*

was kept up during the warm season. With regard to practical results from those observations, we need only state, in this place, that any marked degree of excess of humidity in any locality, as compared with the standard observations at Essex market was, without exception, found to be associated with an excessive constant sickness-rate, and particularly with infantile diseases and all kinds of contagion and infection."

Mr. Clark has very properly dwelt upon this subject at page 12 of his pamphlet (printed Address).

I now come to the third division of my subject:—Mr. Clark's scheme is not without faults. It is true that many of its defects are such as are inherent in all schemes of the kind, and it does not at all follow because we perceive certain weak points in it, that we should, therefore, condemn it altogether. At the same time I will say that certain apprehensions which are entertained regarding it appear to me to be not altogether ill-founded. Objection is taken by some to the street gullies, or to the ventilating grids and smaller drains; others most fear the power and effects of the "storm waters;" while the *cost* is what all must regard with interest and anxiety. Mr. Clark declares that he can thoroughly command the storm waters, or at least prevent their doing much harm. He also promises to prevent all evil effects that might arise from the escape of sewer gases into dwellings. This he intends to do by gratings, and pits or traps acting on the syphon principle. I hope he may succeed in achieving all that he desires. Yet, with the medical testimony of past times before us, we cannot possibly forget that, in spite of all the science and care which is brought to bear on this subject in England, the escape of sewer gases (gases of decomposition) is by no means a thing unknown;

on the contrary, that it occurs frequently; and that it is directly associated, by Medical men, with the prevalence of that terrible disease—Typhoid fever.

Again, Mr. Clark's scheme is still incomplete. It has not yet reached the northern parts of the Town; and even in the southern parts it has been successfully completed only in some places. I mean to say that those places are as yet quite exceptional where we have house-drains and water-closets all complete and in working order; and yet this part of the work, which may be called the private portion of it, is perhaps of even greater importance than that which relates to the construction of the larger sewers. We have yet to learn from experience whether the water-closet and house-drain system in Calcutta is good and harmless. We cannot at present form a fair judgment on this point. I must say I fear it will prove not altogether so free from objection as some are inclined to believe. At present the sewers convey vast masses of filth in a state of decomposition, and they pour a flood of putrescent matter into the water-courses intersecting the low, undrained land of the Salt Lake area.

I have thus arrived at the conclusion that the Drainage Scheme is a very good one, *so far as it is a mere Drainage Scheme, and nothing more.* It is a very great work, evincing much practical knowledge, skill, patience, and care. The full engine-power is capable of lifting one million gallons per hour; and when the drains are complete they will be upwards of 100 miles in length. As far then as mere drainage goes, Mr. Clark will be, and I believe he has already proved himself to be, a great public benefactor. But I now come to what appear to me to be the two main defects of his system regarded

as one of *sewerage*, and not of drainage alone : 1*st*—The solid excreta should be excluded ; 2*ndly*—The outfall arrangements are very defective. With regard to the solid fæcal matter, Mr. Clark says of his system : "It will convey away here, as in other places, perfectly and innocuously all the solid and fluid excreta of the population." Gentlemen, I much doubt it ; but I shall return to this point. I proposed to relieve Mr. Clark's scheme of the solid excreta, and so leave it, as it appears to me, an infinitely better project than it is at present (a true drainage scheme and not a thorough sewerage one). But Mr. Clark supposed that comparisons were being instituted which were unfair. I for one did not wish to establish any comparisons between two things which are entirely different in their nature, and therefore not to be compared; but, with others, I believed that it would be better to take the solid excretal matters away separately; and I pointed out how this could best be done. Mr. Clark says : "If a dry conservancy system were carried out, the drainage of Calcutta would remain as absolutely an indispensable necessity to the health and well-being of the inhabitants of Calcutta as it is now." *This is perfectly true ;* but some believe that the converse of this proposition is also not only true, but a matter of much importance,—*i. e.* Even although the drainage were *perfect* in every respect, the solid fæcal matter ought to be removed separately.

Mr. Clark makes out the annual cost of a dry conservancy system for Calcutta to be 20 *lacs of rupees*, or £200,000! My calculations and estimates on the same subject will be found at p. 106 of my Report. Briefly they amount to this: to carry out a system of dry conservancy for Calcutta (whereby 200 tons of night-soil and sweepings would daily be removed

from the city) would cost something like Rupees 1,64,383 *per annum*, over and above the cost of the present Conservancy Establishment, which amounts to Rupees 1,43,066. This extra charge would render it possible greatly to increase the present Conservancy Establishment of the Town; it would pay for the daily transport, by rail, of 200 tons of waste matter, to the Piallee river, which is 18 miles from Calcutta; it would cover the rent of four square miles of land to be taken up for agricultural purposes; and it would also meet the cost of a very large establishment, numbering 500 men, who would remain on the ground which was to be reclaimed, and who would, without delay, mix the night-soil with earth, convert it into *poudrette* by means of pug-mills, and then dispose of it on the fields.

I calculated that the profits of such land cultivation would, several times over, cover the cost not only of the extra establishment entertained, but even of all the conservancy charges of Calcutta; but even if all current expenses merely were thus repaid, without there being any profits whatever, all that is desired would be fully realized. I still believe that some such scheme comprises the best mode of getting rid of solid excreta, which in my opinion cannot, with safety, be allowed to pass into the drainage system of Calcutta.

I am well aware that in connection with such Conservancy problems there are two opposite parties. In favor of the dry earth system the following is worthy of your attention:

In December 1865, the Secretary to the Government of India, in the Military Department, in his letter No. 1326, dated 30th November, to the address of the Quarter-Master General, distinctly states that "the Right Hon'ble

the Governor-General and His Excellency the Commander-in-Chief are perfectly in accord as to the superiority of the dry earth system of sewage."

Dr. Edward Goodeve, who was for many years in Calcutta, and whose judgment is a very valuable one, as probably most of you know, has written on this subject as follows:

"Some surprise was expressed in Europe on the absence of sewage or drains for our Indian barracks and hospitals. It would not be difficult to show that the dry system is most suited to the purpose even in England, much more is it suited to India. If to the daily removal system be added the dry-earth conservancy, which is now greatly in use in India, there can be little doubt that the problem of the best possible way of dealing with the *excreta* would be solved, and that the plan would be far preferable to that of sewers and drains."

Again, Dr. Mouat believed "in the absolute necessity of separating the sewage of Calcutta from its drainage." In a Memorandum which he wrote on this subject, he expressed the following opinion: "The result of this ill-assorted union will be disease and death in a larger measure than prevails at present with all the abominations of the open earthen sewers of the native town."

Again, Dr. Cornish, the Sanitary Commissioner of Madras, who has devoted much attention to this subject, writes thus:

"There is no doubt that the 'dry' system of conservancy is the best that could be devised for a country where the temperature of the air is always high.

"The evils of the sewage system in Europe are now gradually becoming apparent, and in another quarter of a century there is no question but that the nuisance will

have become so serious as to lead to a thorough change of system. The rivers flowing through towns are in many instances already so polluted, that fish will not live in them; nor can the public drink of such water with impunity." Again, "the water-closets, house-drains, and sewers in European towns, it may be noticed, remain inoffensive during the months of spring and winter; but as the temperature of the air increases, so surely do the *cloacæ* begin to emit offensive effluvia, and the hotter the summer and autumn, the greater the nuisance from drains and running streams polluted by sewage. Whenever the temperature of water rises above 60° Faht. it ceases to absorb gases well, and becomes therefore a bad vehicle for the removal of organic matter in a state of decomposition."

It may here be mentioned that from 350 observations made by Mr. G. A. Prinsep, the mean temperature of the surface water of the Hooghly, everywhere between Calcutta and the sea, was found to be 81° Faht.

I am aware that the Army Sanitary Commission in England recently concurred in the opinion expressed by the Justices of the Peace for the Town of Calcutta, that my proposals for removal of the night-soil of Calcutta cannot be entertained, or at least need not be discussed, on account of the great cost they would involve. I bow to the opinions of such high authorities. At the same time, Gentlemen, it is worth while asking what is really being done at the present time. I will tell you. The Calcutta Suburban Municipality are daily sending down, by rail, in covered receptacles, nearly ten tons of night-soil to the Piallee Bridge, at a daily cost of (I think I am right in saying) Rs. 47-13. Thus, in point of fact, that part of my scheme which entails expense (and which

has just been rejected on account of its cost by the Army Sanitary Commission) is *actually adopted*, and being carried out! whilst no effort whatever is made to counterbalance this by reproductive cultivation. Ten tons of valuable manure are daily taken away at great cost,—*i. e.*, at a cost of Rs. 1,434-6 *per mensem*, or Rs. 17,214 *per annum*; and what is done with it after it has been conveyed 18 miles from the city? It is thrown into the Piallee river. It must be allowed that this is a very wasteful process; and all I will say is that such a mode of procedure is infinitely more expensive than the measures which were suggested by me—measures which have been summarily rejected at the very time when something like half a Million Sterling is being voted for the continuation of Mr. Clark's drainage system.

If the Salt Lake area is to be reclaimed in connection with the Drainage System, we must remember that the estimate for this great work alone was over *Seventeen Lakhs of Rupees*. Either this must (it appears to me), be considered an integral part of Mr. Clark's scheme, or it must be regarded as a separate affair altogether, the object of which will, in a measure, be to rectify the evils of Mr. Clark's sewage operations at and beyond the Tengra outfall. Unless reclamation is had recourse to, the evils at the outfall must increase. Colonel Hyde, foreseeing this, has all along concurred with those who plead for regular sewage irrigation and cultivation. Failing this, he pointed out that an artificial cut might be made through the Salt Water Lake from Tengra to a point in the Bidyaderia river, where there would be a certainty of the sewage being carried away. Self-acting sluices would be required at either end of this cut "so as to permit only of the ingress of the tide at Tengra and

its egress towards the Bidyaderia. The intermittent stream (which could be well scoured by a reservoir at Tengra) so produced, uniformly flowing to the East, would, with certainty, carry away all sewage turned into it." This seems to be a proposition well worthy of consideration at the present time.

Mr. Clark writes: "The drainage system will be a permanent work of great original cost, and small annual expenditure when completed." I hope it may be so; we have no precedents in India to judge by. The drainage of the city of Glasgow (with a population, like Calcutta, of something like half a million souls) is said to produce deposits in the harbour of the Clyde at the rate of 100,000 cubic yards yearly, and to entail an annual expenditure of £8,000 for its removal. It may be that much more thorough clearance is there required for purposes of navigation than would be necessary at the Salt Lake. At the same time it must be remembered that the deposit of silt must be very much greater in the case of the Calcutta drainage than it is at Glasgow. In any case, I think it not improbable that a considerable sum will annually have to be set aside under this head, even after the drainage is complete; indeed, it will necessarily be much greater after its completion than it is at present.

Mr. Clark writes of the "dry system" as follows:—

"On the subject of dry earth conservancy, I have not one word to say in disapproval. It is suited especially to small villages in England, and elsewhere, if the people could be got to think so. It is suited also for any comparatively small place where labor is cheap, and well under command,—such as jails, &c.; but for a large city like Calcutta, on the score of expense alone, it is simply impossible; it is especially unsuited to the habits

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and feelings of the great mass of the population; and, according to my opinion, it is unnecessary."

You will perhaps agree with me that the *necessity* for the dry conservancy scheme need scarcely be discussed if it be allowed to be *impossible*. Further, I have yet to learn that there is anything in the manners of the Hindoos to warrant us in keeping waste matters away from the soil; rather perhaps are underground sewers and water-closets alien to their traditionary customs and modes of thought.

I now come to the outfall arrangements at Tengra. In my humble opinion they are very defective and faulty. Mr. Clark has written as follows on this subject:

"The high level sewer is 8,248 feet long, and is capable of conveying about two million gallons per hour; its fall is four feet per mile; it terminates in an open excavation through the one square mile of area reclaimed from the Salt Water Lake, which is 8,900 feet long; and at its eastern extremity, distant 3¾ miles from the Circular road; this open channel communicates with a natural stream.

"An enormous quantity of silt has accumulated in this open channel during the past two years, and by far the greater part during the last rainy season. A careful measurement shows it to be no less a quantity than 14,00,000 cubic feet, which has passed through the pumps, and necessitates the re-excavation of the channel immediately. It chiefly consists of the *débris* from the road surfaces of Calcutta, mixed with feculent matter. This large accumulation proves the power of the streams running in the sewers to transport it, and to keep them clean; they have done so to the present time, in a most satisfactory manner; the result is precisely that which was intended."

To my thinking, Gentlemen, the blocking up of the Tengra channel should be regarded as a *consequence* rather than as the *avowed object* of the Drainage System.

I am not an advocate for magnifying the importance of undetected germs of disease. If human vision, the microscope, and chemical analysis fail to detect impurities, they may pass. But here we have 1,400,000 cubic feet of silt mixed with feculent matter in a state of decomposition; in other words, we have a channel nearly two miles in length choked up with pestilential sludgy mud and decaying sewage refuse; at least we had this a short time ago; it is now being cleared out. Coming events cast their shadows before them, and I have visions of other water-courses polluted and blocked up by masses of mud and feculent matter. The destruction of putrescent organic matter by oxygen in water is neither so rapid nor so perfect as some formerly believed. We must remember that our Calcutta sewers do not carry off night-soil before it has commenced to decompose; whilst the effluent waters at Tengra visibly contain fæcal matter in suspension, undissolved and unoxidized.

I am aware that Mr. Clark does not think at all so seriously of this fact as most medical men do. He writes on this subject as follows:—

"Granted, for sake of argument, that the dry conservancy is carried out for the whole city at an annual cost of *twenty lakhs*, would the drainage of the city, then, be accomplished? Would not the house-drainage of fluid filth, as represented in quantity by the water-supply, still have to be provided for; as also the sub-soil drainage and the storm-water? In order to show the proportionate quantities of these several fluids, I have prepared a coloured diagram, the centre spot of which shows the

quantity of feculent matter ; the next circular area, the house drainage; the next what may be assumed to be the sub-soil water; and the largest circle, the daily quantity of the storm-water equal to ¼ inch per hour over the whole surface. The centre spot is, therefore, as a drop in the bucket; and when providing for the other fluids, the inclusion or exclusion of this really makes not an iota of difference."

I am well aware that there will be great dilution, yet it is quite possible that there may be danger nevertheless. The excreta of Calcutta will be mixed daily with twelve million gallons of water, so that the dilution of both liquids and solids taken together will be as 1 in 120, while the dilution of the solid excreta alone will be as 1 in 390. And Mr. Clark adds: "If this is not high enough for safety, the limit may be attained by the employment of more pumping power." We naturally ask what *is* the limit of safety in such a matter ? The following opinions are amongst the latest from England on this subject. In a new and able work (recently received) on the "*Treatment and Utilization of Sewage*," by Dr. W. H. Corfield, Professor of Hygiene and Public Health at University College, London, a work prepared for the Committee of the British Association, I find the following extract from the First Report of the Commission on Rivers' Pollution: —

"We are led in each case to the inevitable conclusion, that the oxidation of the organic matter in sewage proceeds with extreme slowness, even when the sewage is mixed with a large volume of unpolluted water; and that it is impossible to say how far such water must flow before the sewage matter becomes thoroughly oxidized. It will be safe to infer, however, from the above results, that there is no river in the United Kingdom long enough to effect the destruction of sewage by oxidation."

Again, a portion of Sir Benjamin Brodie's evidence before the same Commission runs as follows:—

"I believe that an infinitesimally small quantity of decayed matter is able to produce an injurious effect upon health. Therefore, if a large proportion of organic matter was removed by the process of oxidation, the quantity left might be quite sufficient to be injurious to health. With regard to the oxidation, we know that to destroy organic matter, the most powerful oxidizing agents are required: we must boil it with nitric acid and chloric acid, and the most perfect chemical agents. To think to get rid of organic matter by exposure to the air for a short time, is absurd."

The recommendations submitted to Her Majesty by this very important Commission were to the following intent:—

"That the casting of any solid refuse, or the discharge of any polluting liquids, such as those defined above, into any river or stream, be absolutely prohibited under adequate penalties ; and that a central authority or board of not more than three persons be established, with power to enforce the enactments relating to the pollution of streams, and to ascertain and cause to be removed the sources of contamination of public and domestic water supply."

Again in the Report of the Select Committee on the Metropolis Sewage (known as Lord Robert Montagu's) it is stated that—

"No efficient artificial method has been discovered to purify, for drinking and culinary purposes, water which has once been infected by town sewage; by no known

mechanical or chemical means can such water be more than partially cleansed. It is always liable to putrefy again. Processes for filtering and deodorization cannot, therefore, be relied upon to do more than mitigate the evil. Water which appears perfectly pure to the eye is sufficient, under certain conditions, to breed serious epidemics in the population which drinks it."

I know Mr. Clark will say that this does not apply to the case of Calcutta, because the sewage is voided into streams from which the people do not drink. This is true; yet the general pollution of a river may be a matter of serious moment, in a medical point of view, even although its water is not used for drinking purposes; and I may here mention that I am informed by Mr. Galiffe, Collector of Canal Tolls, whose official duties take him a great deal to the Salt Lake channels and the canals on this side of them, that within the last year vast quantities of maggots have appeared (during the hot weather) in the water-courses now referred to. This is a new thing since the sewage was voided at Tengra.

The above extracts, Gentlemen, serve to show how this question of river-pollution and of sewage-dilution is regarded by some of the highest authorities in England. I am of opinion that we should not trust to great dilution of solid excreta with water. On this subject I expressed myself as follows two years ago:—

"It is quite true that while a small quantity of water favors putrefaction, a large quantity diminishes the same tendency; and it is also to be allowed that minimizing an evil is good, so far as it goes. Yet indefinite dilution with water will not destroy septic poisons, and he would be an over-confident man who would assert that he could determine the point of dilution at which all danger ceases.

Modern experiences tend to establish the belief that fæcal matter, although diluted to a vast degree, may be productive of the most disastrous results. The history of the "East London Outbreak" of cholera, the facts of which were so deeply scrutinized by Drs. Farr and Radcliffe, ought to teach us to be very careful how we pronounce in favor of water dilution as a source of safety against fæcal poisoning. Whether the cholera in question originated from contamination of the reservoirs at Old Ford, or whether, as others believe, it was due to the storm overflows of the Metropolitan Sewage works, every thing goes to prove that danger is to be apprehended from effete organic matter in a state of decomposition, how great soever may be the quantity of water holding it in suspension. The limits of the developing power of animal poisons are altogether undetermined."

To countenance the discharging of human ordure into water-courses, no matter how great may be the quantity of water present, is to encourage the introduction of what the Editor of the *Lancet* terms—"the thin edge of a vicious principle." In 1861, Captain, now General Beadle pointed out that the canal, where it forms a basin towards the city, ought to be shut off so as to receive no polluted storm-waters. Colonel Hyde, to whose opinion much weight will always be attached in India, was from the first averse to sewage being discharged into the deep water channel of the Salt Lake. I do not for a moment mean to imply that Colonel Hyde is an opponent of Mr. Clark's Drainage System; on the contrary, he has always strongly supported it; I merely here cite his opinion regarding the pollution of water-courses by the introduction of sewage.

As I have already shown you, Dr. Mouat was violent-

ly opposed to any such mode of disposing of night-soil. Mr. Longridge, a Civil Engineer who made a special study of the subject, was equally opposed to the voidance of sewage into the channels and creeks beyond the Tengra outfall. Dr. Chevers has, for many years, persistently warned the Municipal Commissioners against the danger, in a sanitary point of view, of voiding the sewage of Calcutta (even when diluted by storm waters), in the direction of the Balliaghatta Canal. *Lastly* —Mr. Leonard, whose judgment is known to be very cautious, careful, and valuable in such matters, has written as follows:—

"I have always said that this disposal will not do, the matter will not float away ; it will be a nuisance to the canals, and I believe even to Calcutta itself." Again, he writes: "It will not do to drop it into the Salt Lake Channel, and there allow it to float about—a nuisance to thousands. To pour into this locked-up basin the drainage of Calcutta, for a considerable part of the rains, would, I think, in a short time, render the place deadly. I am aware that the water would be entirely flood-water, and that the offensive matter contained in it would be highly diluted, so much so, that I think if the contents thus diluted could pass away through the canals without obstruction, the admission of the flood-water from the sewers would not be seriously objectionable ; but if it were received in an enormous basin, where the sewerage could settle down, and only the tolerably clean water pass off over an outlet, the foul matter would soon accumulate to such an extent that the canals would become poisonous."

You will thus see, Gentlemen, that I am by no means singular in somewhat dreading the effects of the present system, in its relation to solid excretal matter. Setting

metaphor aside, let us ask—What, as a matter of fact, is the quantity of sewage which Mr. Clark calls "a mere drop in the bucket?" When the Drainage System is complete, the solid excreta will probably amount to over 100 tons a day. At present, I am told it is something like 40 tons, which may, in a sense, be hidden, but it is all there nevertheless.

In having recourse to vague figures of speech, I think Mr. Clark treats this part of his subject in an unscientific manner. Indeed, some may think that he even lays himself open to the charge of trifling with a great subject, inasmuch as his style of reasoning implies a magnificent disregard of facts and past experiences of great importance. To argue on the "potentialities" of matter from mere quantity, is, I contend, not the proper way to look at this subject. By the same faulty logic we might say that because a small-pox vesicle is very small, that therefore it cannot be productive of much harm. But what is the real truth? It is almost unnecessary to tell you, Gentlemen, that from that single speck of animal poison a whole population might be infected. Again, a plague-spot on the human body was a small thing in itself, but it was the almost certain precursor of death. Professor Huxley tells us of chalk formations which are 1,000 feet thick, but which entirely consist of the skeletons of animalculæ, each one-hundredth of an inch in diameter. I need scarcely trouble you with similar illustrations. The question is not what a single drop or a single unit of any kind can do; but what an infinite multiple of such units may do, in the course of time. The actual result of draining into European rivers and into the sea is indicated in the following passage from my Report:—

The condition of the Thames at London, the Clyde at Glasgow, the Medlock and Irwell at Manchester, the Tame at Birmingham, the Mersey at Stockport, Birkenhead, Liverpool, and Booth, the Seine at Paris, the Elbe at Hamburg, the Iser at Munich, and the Danube at Vienna, has, at one time or another, arrested public attention, from the dangerous degree of sewage-pollution that had been reached. Similarly, it has been pointed out that the harbours of Rio de Janeiro, Havana, Brest, and Marseilles are in the most intolerably filthy state; whilst the open sea itself at Naples, at Cadiz,—and to go nearer home—at Brighton, (burdened with privy filth, the odours of which sea breezes cannot dissipate) is foul and obnoxious.

Represent the matter figuratively as we may, the broad fact remains that hundreds of tons of noxious matter are here being disposed of on wrong principles.

This is no assumption, but a simple demonstrable fact. Experience justifies the statement that this is dangerous (as the extracts which I have read fully prove); experience further negatives the assertion that such an accumulation of feculent matter need not be thought of with any anxiety, because it is largely diluted.

I think it is much to be regretted that so high an authority as Mr. Clark should publicly enunciate, as true, maxims which are opposed to much valuable medical testimony.

But I gladly pass to a subject on which Mr. Clark and I *entirely* agree,—I mean the reclamation of the Salt Lake area. Gentlemen, I feel that I have already greatly taxed your patience by speaking at such length, and I regret to find that I have not time at present to go carefully into this most important subject of reclamation. All

I will say is that I am as staunch an advocate for it as any man can possibly be; indeed, that I regard it as a great sanitary necessity in connection with the present Drainage and Sewerage System. Unless the land is reclaimed and utilized, the sewage must, as at present, be allowed to pass into the tidal channels and creeks of the brackish Lake area, which is to be avoided by all possible means. *Forty-one years ago*, Lord William Bentinck (who had for 14 years been a Commissioner of Drainage for the Lincoln Fens) wrote a Minute on this subject,—urging the importance and feasibility of thoroughly draining and reclaiming the salt marsh adjoining Calcutta. He was supported in his views by very high Engineering authorities; and the Court of Directors were pleased to approve of the suggestions as promising "much public benefit," and as "affording a gratifying proof of their Governor-General's desire to improve the commerce of India and increase the salubrity of Calcutta and its vicinity." The Lake, as you know, still remains unaltered and unreclaimed! This is indeed a subject which should not be allowed to rest.

I have now, Gentlemen, only to apologize for having taken up so much of your time, and I beg to thank you for having given me so patient and attentive a hearing.

CALCUTTA: PRINTED BY THACKER, SPINK AND CO.

BIRMINGHAM SEWERAGE BILL.

EVIDENCE

BEFORE

PARLIAMENTARY COMMITTEE,

TOGETHER

WITH AN APPENDIX,

EXTRACTED FROM A DISCUSSION AT THE SOCIETY OF ARTS,

RELATING TO

MAJOR-GENERAL H. Y. D. SCOTT'S

PROCESSES

FOR

PURIFYING SEWERS

AND PREVENTING

TYPHOID EMANATIONS;

FOR CLARIFYING SEWAGE,

AND CONVERTING THE DEPOSIT INTO

LIME OR CEMENT

BY

FIRE.

LONDON:
PRINTED BY NISBET, PARKER & ARNOLD, 45, MARK LANE.

1872.

Communications on the subject treated of in the following pages should be addressed to

THOMAS W. SCOTT, Esq.
SUNNYSIDE,
EALING,
W.

July 15th, 1872.

SUMMARY OF EVIDENCE.

Corporations responsible for nuisance.

1. Corporations are responsible for Sewage nuisance, and must remove it at any cost.

Mr. HAWKSLEY 3140
Dr. VOELCKER... 4156
Mr. RAWLINSON ... ... Appendix, p. 27

Sludge must be removed.

2. The sludge must be taken out of Sewage water before employing it for irrigation. If the sludge be allowed to deposit on the land, it chokes the pores of the soil and creates an intolerable nuisance.

Mr. HOPE ... 1935, 2119, 2236, 2312, 2324, 2502, 2539, Appendix, p. 27
Mr. HAWKSLEY 3120, 3575
Dr. ODLING 4015
Dr. VOELCKER... ... ... 4139, 4144, 4157
Mr. FOWLER 5868
Dr. LETHEBY 6065, 6073, 6108
Mr. BRAMWELL ... ... Appendix, p. 28
Dr. ODLING ... ... Appendix, p. 30
Mr. MARSHALL ... ... Appendix, p. 30

Chemical precipitation necessary.

3. Subsidence and straining without proper chemical precipitation do not efficiently clarify Sewage water.

Mr. HARPUR 2655, 2656, 2657
Dr. LETHEBY 6079, 6123, 6126, 6136

Clarified Sewage best for irrigation.

4. When filtration is necessary for the complete purification of Sewage, the better clarified

Clarified Sewage best for irrigation.

the Sewage water the less is the area of ground necessary for the filtering bed. The best clarified Sewage is also the best for irrigation.

Mr. Hope 2534
Dr. Odling 4014, 4015
Dr. Voelcker 4139, 4144, 4167, 4212, 4356, 4359, 4360, Appendix p. 25
Dr. Letheby ... 6079, 6123, 6126, 6136. Appendix p. 31

Sludge valueless as manure.

5. Sludge deposits, whether dried or not, have little or no value as manure. The chief manurial value of Sewage passes off with the liquid.

Dr. Hill 1116
Mr. Hope 2315, 2502
Mr. Harpur 2801
Dr. Frankland 3823
Dr. Odling 4078
Dr. Voelcker... ... ... 4140, 4142, 4212

General Scott's Cement system the best.

6. General Scott's plan of precipitating with lime, or lime and clay, and the conversion of the deposit into Lime or Cement by calcination, strongly recommended. General Scott's process stated to be the best, and now carried out at Ealing without any nuisance.

Mr. Hawksley 3433
Dr. Frankland ... 3770, 3771, 3773, 3822, 3929, 3930, 3946, 3947, 3960
Dr. Odling 4078
Dr. Voelcker ... 4151, 4161, 4330, Appendix, p. 25
Professor Abel ... ... Appendix, p. 25
Mr. Bramwell ... ... Appendix, p. 28
Dr. Letheby ... ... Appendix, p. 31
Mr. Grantham ... ... Appendix, p. 31
Mr. Marshall ... ... Appendix, p. 30

Cement valuable.

7. The Cement produced by General Scott's system a very valuable one.

Mr. Hawksley 3261
Dr. Frankland 3824
Mr. Bramwell 5767, 5769
Professor Abel ... ... Appendix, p. 25
Mr. Jones ... ... Appendix, p. 29

General Scott's system especially applicable to Birmingham.

8. Use of Lime also recommended at Birmingham to neutralize the acidity of the Sewage, which destroys the joints of the drains.

Dr. Hill 1107, 1108, 1109
Dr. Frankland 3695

General Scott's system of purifying Sewers.

9. General Scott's system of introducing the chemicals at a distance from the outfall recommended, so as to thoroughly mix them with the Sewage, cleanse the drains, and prevent the formation of sewer gases.

Mr. Hawksley 3600, 3601
Dr. Frankland 3822
Dr. Odling 4076
Professor Abel ... ... Appendix, p. 25
Mr. Jones ... ... Appendix, p. 29

EVIDENCE

GIVEN BEFORE

PARLIAMENTARY COMMITTEE.

Dr. Alfred Hill *Sworn.*

Dr. Alfred Hill. *23rd April, 1872.*

1074. You are Doctor of Medicine and Professor of Chemistry in Queen's College and Analyst to the Borough of Birmingham?—Yes.

1104. Have you directed your attention also to the matters which are poured into the sewers from the manufactories?—Yes.

1107. Could the remainder (the acid matters) be neutralised by lime in order to prevent any destructive influence?—Yes.

1108. I believe, in a concentrated form, they tend to injuriously affect the construction of the sewers?—Yes; they destroy the mortar and dissolve it.

1109. I believe it is important that sewers should be kept practically water-tight?—Yes; unless they are water-tight and kept in good preservation they necessarily admit of lodgments of fecal matter, and after a time it must decompose and be very injurious.

1116. At the present time, I believe, there is great complaint at the Saltley Works of the plan which is now adopted?—Yes. * * * The nuisance there arises from the decompositions of fecal matters and detritus, which are heaped into them in enormous quantities. **There they lie for months, and even more, simply because a market cannot be found for them,** or because they are not sufficiently dry to be carted away. * * *

Mr. William Hope *Sworn.*

Mr. Wm. Hope, V.C., Romford. *24th April, 1872.*

1800. I believe you are the gentleman mentioned in the letter of Mr. Fowler as being a gentleman very desirable to consult for the Borough of Birmingham, on the question of disposing of their Sewage?—I believe so.

1935. Have you examined other systems which profess to deal with Sewage chemically in the same way as the A B C?—I may mention that I am the lessee of the Sewage at Romford. I always enquire into all these matters, on the chance of my being able to do something with the sludge of Romford, to make a profit out of it; **at present it is a nuisance and a trouble.**

2119. Do you provide for the exclusion of the ordinary excreta? * * * **I altogether approve of taking the sediment from the Sewage.** * * *

2236 But with regard to the Sewage of Birmingham, on the whole, it is really neither one thing nor the other? (That is, "not irrigation and not wholly filtration.")—I think it is very much the same as every other Sewage scheme must be. **As to the solid matter, it must be taken out.**

2311. You see that you thought of the enormous strain (upon the purifying process of the land) at that time? (11th September, 1871.)—Yes.

2312. * * * At that time, at any rate, you thought that, as a matter of course, a few years would produce an excess of organic matter in the filter?—I should be of the same opinion now, **if it was proposed to run sludge on to the surface of the land.**

2313. What do you mean by sludge?—**Sewage sludge?**

2314. Detritus or fecal matter?—I mean sludge, not the detritus; the sludge arising from all kinds of sources; the sludge which at present creates a nuisance at Saltley. It is to be taken out, as I explained yesterday, at Dunton.

2315. Where is it to be put then?—It may be manufactured into Cement, if General Scott can do it; or into portable manure, if any one can do it; or it may be made to commit suicide.

Mr. Wm. Hope, V.C., Romford. — 24th April, 1872.

2324. You say that it is peculiarly offensive?—Yes; when it is allowed to stagnate and decompose, **it stinks worse than anything I ever smelt out of Constantinople.**

2501. There is always a certain amount of exhalation from a sewage farm, is there not?—There is a certain amount of smell from every farm.

2502. Not at present, certainly?—There is really so little smell about a Sewage farm **except from the solid matter. I have on my own to take out the sediment. I have no use to put it to, and it accumulates.**

2534. May the whole of the Sewage be poured on to the land without any previous treatment?—**Dr. Frankland's** experiments proved that **if the suspended matters were first taken out, the liquid Sewage of 6,000 might be put upon one acre.**

2539. Now be good enough to refer to your own Report, in p. 74, the passage to which you have referred. **"It would not do to allow this solid matter to be exposed on the surface of the ground in hot weather in constantly accumulating quantities?"—Yes.**

Mr. Samuel Harpur *Sworn.*

Mr. Samuel Harpur. — 25th April, 1872.

2580. Are you the Engineer and Surveyor of the Merthyr Tydvil Local Board of Health?—I am.

2654. Well, now one word about the filters. In your opinion, are the filters likely to get choked at all?—There is no evidence of choking in our case at present.

2655. I am referring to the filtering area?—We prevent the choking by digging—by constant attention.

2656. I was going to ask you about that. I may take it that if the filtering areas did become choked, they might become a nuisance?—Oh, yes.

2657. Well, now, will you be good enough to tell the Committee how you would propose by the present system to obviate the chance of their becoming a nuisance by choking?—Well, **we intercept all the solid matter in the first**

Mr. Samuel Harpur. — 25th April, 1872.

place. Nothing passes forward but strained Sewage; Sewage that has passed through a straining bed. That carries forward **a little flocculent matter,** which rests upon the surface of the soil, and **we keep men constantly employed** in digging the furrows between the ridges of the land.

2801. Supposing there was a difficulty in disposing of it, it (the solid matter) would become an actual nuisance?—**If they did not burn it, or otherwise dispose of it.**

Mr. Thomas Hawksley *Sworn.*

Mr. Thomas Hawksley, President of the Institute of Civil Engineers. — 26th April, 1872.

3079. Were you appointed Engineer of the Sewerage Inquiry Committee in August, 1871?—Yes.

3115. I understood you to say that it (the sludge) was converted into something more solid than that? * * * **It can be converted, by General Scott's process, into a very useful and valuable Cement.**

3120. Now, my friend will ask, if I do not, whether you will venture to say that that process can be carried on over this land without any nuisance?—I am certain of it; **if you kept off the untreated sludge, which is very offensive.**

3123. You have said that Sewage, when it is poured upon the land without any preparation of this kind, does make a great nuisance. You have often said that?—Yes; the nuisance varies in degree, according to the state of the weather—the comparative amount of water with which the Sewage becomes mixed. * * *

3139. You do not know any mode of dealing with Sewage which does not incur considerable annual loss?—No.

3140. Do you think the **Corporation ought to face that?—Yes, they must. If they are responsible for a nuisance, and it costs them a great deal to remove the nuisance, or to obviate it, they must encounter the cost.**

3257. And where has that process been carried on of using the sludge for the purpose of manufacturing Cement?—It is carried on at Ealing, where it may easily be seen.

3258. That is General Scott's process?—Yes; it is very well

Mr. Thomas Hawksley, President of the Institute of Civil Engineers.

26th April, 1870.

described in a specification which I have brought with me, and if you will allow me, I will place it in the hands of the Noble Lord. (Handing in specification.)

3259. At Ealing is the Sewage treated chemically before any sludge is deposited?—Only so far as that milk of lime is used.

3260. That merely causes precipitation?—Yes; and then clay is added afterwards for the purpose of enabling the precipitated element plus the clay, enabling Portland Cement to be manufactured.

3261. That Cement is manufactured out of that sludge so deposited?—**Yes; and a very excellent Cement it is.**

3273. * * * If they ask me what in the abstract I think the right thing, I tell them decidedly that **a method of precipitation, or a mixed system of precipitation and filtering**, would answer the purpose.

3419. * * * I have already stated that as long as the sludge is deeply covered with water it gives off no offensive odour. It is only when afterwards it is got out of the tank, and without being deodorised by chemicals in any way it is spread upon the ground, that an offensive decomposition takes place, which, as has been observed, occasions a disgusting odour.

3433. What is your proposal? We have heard about burning this stuff?—I did not make the proposal, but **it is practically done by General Scott, and done admirably.** It is very combustible. It contains a very large amount of combustible matter; but you will hear all about that from Mr. Bramwell.

3575. * * * **The sludge** which is now formed in the basin at Saltley **is not defecated** in any way, and the moment it gets upon the land the organic matter in it **begins to decompose and give off most offensive effluvia. It is a very abominable thing, no doubt.**

3600. At what point in the conduit do you consider the **Sewage becomes innocuous?**—At the point at which we add, and **immediately we add, the milk of lime.**

3601. Half-a-mile from the Dunton Tanks?—Yes, it will be

very much improved by the addition of the crude sulphate, but it will be rendered quite perfect by the addition of lime.

Mr. Thomas Hawksley, President of the Institute of Civil Engineers.

26th April, 1870.

3607. What will be about the cost per diem?—I think we could make crude sulphate at £3 10*s* per ton, and the lime, there being plenty in the neighbourhood, would cost us 12*s* a ton probably.

Dr. Edward Frankland *Sworn.*

Dr. Edward Frankland, F.R.S.

29th April, 1870.

3614. You are so well known that I need not go through the whole of your titles and honours. You are, amongst other things, Professor of Chemistry in the Royal School of Mines and one of the Royal Commissioners for Enquiring into the Pollution of Rivers?—I am.

3615. You have had a very large experience in the various processes which have been adopted for the purification of rivers from Sewage?—During the last six years I have been almost constantly engaged in studying works of various kinds, with that object.

3656. Supposing crude alumina to be put in at the Saltley Works, and then half-a-mile from the intended tanks at Dunton milk of lime were added, would the deposition you have spoken of take place in the Dunton tanks?—**Yes; I should recommend the sulphate of alumina to be dispensed with. I believe the lime to be added will do the work as well, if not better.**

3695. * * * These liquids are strongly acid and they could not fail to act injuriously on the brickwork of the sewers, causing the sewers to become leaky, and even perhaps destroying them in parts adjacent to the Works.

3770. And you would not treat the Sewage as Mr. Hawksley proposes, with sulphate of alumina?—No; I should prefer to treat it with lime alone; but there are various processes by which it may be treated. **I should prefer to treat it with lime alone, and to use the sludge according to General Scott's process,** which does not occasion the slightest nuisance.

Dr. Edward Frankland, F.R.S. 29th April, 1872.

3771. Making it into Cement?—**Making it into Cement.**

3773. And it is done without any nuisance?—**It is done now, at Ealing, without any nuisance.**

3822. Now, what is the process which you think will be carried on at Dunton, when you say that it will be no nuisance there?—**The process I would recommend** to be carried there **would be the treatment of the Sewage** some time before it comes there **with a mixture of lime and clay.** That produces a copious deposit from the Sewage. It **deodorizes the Sewage very completely, so that it could flow on to the land afterwards without a trace of smell from it,** and a trace of deposit is absolutely inodorous. That **deposit would be first dried and then burnt in kilns,** and then **transformed into Portland Cement.** That appears to me to be the process of dealing with this sludge, which has always been a difficulty. It appears to me that this is the process least open to objection. **I think it is very perfect in preventing nuisance.**

3823. It will be converted either into Cement or into a portable manure?—I am afraid the **manure (prepared sludge) would be nearly worthless.**

3824. But the Cement is valuable?—Yes; **the Cement is valuable.**

3929. You said that the experiment could be carried out at Dunton without any offence at all?—You mean the treatment with chemicals and the removal of the sludge?

3930. Yes.—I can certainly say so with confidence, in the case of the treatment with lime and clay, and the subsequent manufacture of the thing into Cement.

3931. Those experiments would have nothing to do with the conduit; that would not assist in any way?—No.

3932. Supposing you could carry on that experiment at Dunton inoffensively, why should it not be done higher up at Saltley? Why should you not carry on the same experiment at Saltley if it could be done in that way?—Well, I do not see why it should not be done.

Dr. Edward Frankland, F.R.S. 29th April 1872

3946. Or at Dunton: would there be any nuisance caused by the depositing process and by the use of chemicals?—There **I should apprehend no nuisance whatever if lime were employed.**

3947. Afterwards, if the **comparatively pure water were put upon the land,** are you still of opinion that no nuisance would be created thereby?—**I am decidedly of opinion that no nuisance would be created.**

3948. And that eventually the land would so purify the Sewage that it might be put, without causing nuisance, into running water?—I have no doubt of it.

3960. And also the sludge which is deposited?—The sludge which is deposited, **if a sufficient quantity of lime is introduced, such as is used in General Scott's process, will remain for weeks without any smell. The lime deposit and the sludge collected from the Sewage of Ealing,** although I had a quantity thrown upon the ground before me, **was absolutely inodorous.**

Dr. William Odling *Sworn.*

Dr. William Odling, F.R.S. 30th April, 1872.

3973. You are a Fellow of the College of Physicians, a Fellow of the Royal Society, and a Professor of Chemistry at the Royal Institution?—Yes.

3992. It is proposed to add some crude sulphate of alum about half-a-mile from the Dunton Tanks, and some milk of lime in order to cause deposition in those tanks?—Yes.

3993. Do you believe that that can be done without creating a nuisance?—Yes; I believe it can be done without creating a nuisance; but **I consider the addition of sulphate of alum *(alumina)* to be perfectly unnecessary.**

3994. **You think that the milk of lime is sufficient?**—Yes. The Sewage of Birmingham is already charged with a considerable quantity of iron salts, and sulphate of iron is a more powerful disinfectant than sulphate of alumina; and if you add lime to it you will throw down the iron just as you

propose to throw down the alumina, which you propose to add for the sake, I suppose, of spending money on the alumina.

3997. When a deposit of the sludge takes place in the tanks, will it be so defecated as to enable it to be removed without creating a nuisance?—Undoubtedly.

3998. You heard the plan which it is proposed to use at Dunton for taking the sludge from the bottom of the tanks, and using it there on the spot and **converting it into Cement** or into Dry Manure?—Yes.

3999. Does your experience enable you to say that such processes could be conducted without causing any nuisance to the people in the neighbourhood?—Yes; it does.

4000. Or any injury to health?—Certainly.

4001. I believe you have had experience as a medical officer of health in London?—Yes; I was medical officer of health for seven years at Lambeth.

4002. And you have devoted considerable attention to matters of this kind as affecting the public health?—Yes.

4003. Would the precipitation in those tanks allow the water to flow on in the remaining portion of the conduit to a great extent clarified and purified?—Yes; **it would be both clarified** (and in the sense of no longer smelling) **and purified.**

4006. In your opinion would **any nuisance** arise from taking the water so clarified on to the land?—**Certainly not.**

4014. If your view is correct, and these experiments are correct, why is it to deposit at all; it ought all to go on to the land, ought it not?—No, certainly not; we are talking of passing liquid containing organic matter through land. **If, in addition to that, it contains a large amount of suspended matter, which will deposit upon the land, you will require a very much larger area of land.** I should say that it would be quite impossible to do with this area of land if you put the Sewage fresh upon it, and allowed the suspended matter, which is intended to deposit in the tanks at Dunton, to deposit upon the surface of the land.

4015. It is only by taking out previously a certain amount of nastiness in the shape of sludge, and getting it to deposit, that you can do it at all?—It is only in that way that you can do it on such an area as this unoffensively.

4033. For the success of the experiment, it is necessary also to establish that the sludge is so treated that it can be dried and carried away and got rid of without creating any nuisance?—Yes.

4074. Could you not perform all the operations of precipitation and conversion into sludge at Saltley?—As a matter of fact, you could do so. There is no substantial reason why it should not be done there. There are one or two subsidiary minor reasons which make it preferable to do it at Dunton.

4075. But there is no reason as to the place itself; you have room enough?—Yes.

4076. There is no reason in the condition in which it arrives, or the quantity to be dealt with, that would prevent your getting all the sludge out of it at Saltley?—Substantially, I agree with you; and there is this advantage, you put in the lime at a further distance from it, and it is left there in contact with the moving Sewage, and has a greater opportunity to act. If it had been proposed by this Bill to do at Saltley that which it is now proposed to do at Dunton I should be in favor of the Bill; but as a matter of fact, I think it is better to do it on the whole at Dunton, because the lime remains with the Sewage a longer time.

4077. If that was all, it would not be worth while, would it, to spend many hundred thousand pounds in building a long sewer conduit in order that it should be exposed to those conditions?—Certainly not. I only understand that the long conduit is built to convey the water.

4078. As to any commercial value in the thing, either in the road detritus, or in the sludge when dealt with, Saltley would be the better place from the neighbourhood of the railway and canal, would it not?—I believe there is a value commercially in road silt, and a commercial value in this dung, but I do

Dr. William Odling, F.R.S. 30th April, 1872.

not think there is any commercial value in the material that will be extracted at Dunton, unless they make it into Cement.

Dr. Augustus Voelcker, F.R.S. 30th April, 1872.

Dr. Augustus Voelcker *Sworn.*

4132. You are a Fellow of the Royal Society, Consulting Chemist to the Royal Agricultural Society of England, and I believe you were for fourteen years Professor of Chemistry in the Royal Agricultural Society at Cirencester? – Yes.

4136. Are you acquainted with the various plans proposed for disinfecting and clarifying the Sewage?—I think I may say that I know almost every plan which has been brought out at various times.

4137. I believe you have given special attention to the portable manures question?—Yes, special attention.

4138. Do you know the lime process, the A B C process, and all the rest of the processes?—Yes.

4139. What is the effect of all those plans, taking them generally, upon Sewage?—Speaking generally, the effect of all these chemical processes is to remove, more or less perfectly, the sedimentary matter which may be called sludge. None of the chemical agents which are used, and with which I am acquainted, have any marked effect upon the soluble fertilising matters which are contained in the Sewage, and hence it happens that the clarified Sewage for agricultural purposes is as good, or rather, I should say, is better than raw Sewage; for this reason, that none of the fertilising matters are removed by any clarifying or precipitating agents, and **the sedimentary matter, which is of very little agricultural value, removes the impediment in the application of Sewage to the land, which is so great that many farmers, who I have no doubt would use the clarified liquid, will not use the raw liquid on account of the sedimentary matter which forms a deposit, choking up the pores of the soil, and therefore in a**

Dr. Augustus Voelcker, F.R.S. 30th April, 1872.

great measure neutralising the fertilising effects which the substances in solution would otherwise produce.

4140. What is about the proportion of fertilising value of the liquid as compared with the suspended matter?—Speaking generally, seven-eighths of fertilising matter are contained in solution, and of the other about one-eighth.

4142. * * * **Sedimentary matters, indeed, have so little value that it is hardly worth the farmer's while to cart them away to any distance if he can have them gratis?**—That is why there is such an enormous accumulation at Saltley.

4144. May I take it generally, after adding any chemical matters which cause deposition, that there is still contained in the liquid clarified Sewage a large quantity of other matters held in solution in the water?—Nearly the whole of the fertilising matter is held in solution. **The clarified liquid is actually better for the practical application of it to the land.**

4151. What process has that been subject to?—**This has been subject to General Scott's process, which is a very effective one.** Here is another bottle of the same (producing another sample).

4152. That is **chemical clarification without passing through the land?—Yes.**

4155. Have you considered the scheme which is proposed by the Corporation of Birmingham to get rid of the difficulties in treating their Sewage?—Yes, I have.

4156. In all its details?—Yes; * * * **I think that the town authorities ought to be prepared to put their hands into their pockets for getting rid of the nuisance,** and I believe that the authorities of Birmingham are actuated by a sincere desire to remove the nuisance, which has become very bad indeed; in fact, it is intolerable at Saltley at the present time.

4157. We have heard from you and others that at the

present moment merely depositing sludge upon the land gives rise to a great nuisance?—Yes, it does, certainly.

4161. Do you think they (the suspended matters) may be removed in a form that they may be **made into Cement** or dried Manure **without causing a nuisance** there?—**I know that it can be done, and it has been done at Ealing.** I was the other day at Ealing, and I examined the process which is carried on by General Scott there. Here is a specimen of dried sedimentary matter, which has no very disagreeable smell—only a slight earthy smell, but nothing disagreeable. It is a smell which has been very forcibly described as a fellmongering kind of smell.

4162. Is that the Cement?—No; this is the deposit dried.

4163. Have you a specimen of the Cement?—Yes; this is the Cement (producing the same). That is Portland Cement, made at Ealing. Here is the same Cement which I have not opened yet; it has been put into my hand by Mr. Alderman Avery, and it is labelled "Muntz Street Cement, made by General Scott."

4165. **This** (handing in another specimen) has been burnt; **made from the Birmingham Sewage.**

4166. * * * **I am sure that there is no difficulty in disposing of the sludge without creating a nuisance to the people in the neighbourhood.**

4167. Then you would still have the effluent water to deal with?—Certainly; and it is highly desirable, as I have said already, that the best use should be made of the effluent water. It should be delivered to the farmers in the very best condition for application to the land.

4172. I understand you to say to-day that **you recommend the removal of the** sedimentary matter, which has sometimes been called **sludge, from the Sewage before it is used?—Yes, certainly.**

4212. * * * All I can say is that none of the fertilising matters are removed by any of the processes. * * * But

the liquid, after the treatment of chemical agencies, is just as good as it was before.

4330. I ask you, cannot these matters be removed without creating a nuisance?—It would be very dangerous to allow these matters to accumulate for a length of time. **In the case of General Scott's plan you may allow them to accumulate a considerable length of time, because in his process use is made of a very large proportion of lime and clay.**

4332. And you think that that sludge could be removed without creating a nuisance?—I believe it could be removed without creating a nuisance.

4355. You have told me that for utilisation you require a very much larger area of land?—Yes.

4356. Does that affect the question as to raw Sewage or Sewage which had been previously dealt with by some chemical precipitant. **It is recognised, is it not, in Sewage utilisation, that the solid matter is to be kept down, that a process of deposition is applied, so that the water may be as clear as possible going on to the land?—Yes.**

4359. Would the **quantity of land required be diminished** in consequence of the previous treatment by **chemical** and other means?—**Certainly, you would require much less land.**

4360. Have you any doubt whatever that the quantity of land that we propose to acquire will be sufficient in order to purify the Sewage?—I have not the slightest doubt but that the land will be amply sufficient to purify and utilise it to a considerable extent. **Moreover, I believe that the farmers in the neighbourhood will be ready to take the clarified Sewage, whereas they would not take the muddy.**

Mr. Frederick Joseph Bramwell. *Sworn.*

5741. You are an Engineer carrying on business in Great George Street, Westminster?—Yes.

Mr. Frederick Joseph Evanswell. 3rd May, 1872.

5742. Vice-President of the Institution of Mechanical Engineers?—One of them.

5743. And a Member of the Council of the Institution of Civil Engineers?—Yes.

5767. As to the **conversion** of it (the sludge) **into Portland Cement**, what do you say?—**That process is carried on by General Scott, at Ealing, and from what I have seen of it, it appears to be an extremely satisfactory process, and I think would be suitable for the Birmingham Sewage.**

5769. Have you **formed an opinion** as to whether the **process was a valuable one and likely to come into general use?—I think it is; I have the very highest opinion of it.**

Mr. William Fowler. 3rd May, 1872.

Mr. William Fowler *Sworn.*

5862. You, I believe, live at Gravely Hill, near Birmingham?—Yes, I do.

5863. You are by profession a Surveyor?—Yes.

5868. Now, I do not mean to go into the question of the **nuisance** which is experienced at Graveley Hill, at very considerable length; **it is impossible to exaggerate the extent of it?—It is impossible to exaggerate the extent of it.**

Dr. Henry Letheby. 6th May, 1872.

Dr. Henry Letheby *Sworn.*

6061. You are Professor of Chemistry at the London Hospital and Medical Officer of Health for the City of London?—Yes.

6062. And you are well acquainted with the Sewage Farms all over the country?—Yes.

6064. Have you seen the Sewage being removed from the tanks at Saltley?—Yes, on several occasions, the sludge.

6065. **The sludge**, as we understand, apart from the heavy matter and the road detritus, is to go to Dunton. **It was very offensive**, was it not?—**Very.**

Dr. Henry Letheby. 6th May, 1872.

6073. It has been deluged with Sewage for many years, has it not?—Yes; I saw it turned up on the 18th January last, and it was perfectly black. **It smelt to that degree a quarter of a mile off, in a high wind, that I could smell it quite distinctly.** I do not know that I have ever seen soil in such a state. It was in the most offensive state, and it was saturated with Sewage.

6074. In your judgment would it be bad for Sewage irrigation purposes for years to come?—Yes; I think, however well it is drained, it will take many years before plants will use up that offensive matter which is now in the soil: it will not for many years be in a condition to take Sewage matter.

6076. In your judgment, having regard to the position of that land and to the amount of population around it, is it, under any circumstances, a place for a Sewage farm?—I do not think so, considering that they have an opportunity now of taking, if Parliament sanctions it, their Sewage to the place where they propose to take it, **to carry out a process of defecation, and to put clarified Sewage upon the land where I do not believe it will be any offence to anybody.** I do not see the reason for carrying on any works at Saltley.

6079. May I take it, therefore, that you lay it down before the Committee that the proper way of dealing with the Sewage would be, in the first place, some **chemical process of defecation to separate the suspended matter** and some portion of the matters in solution, and then use the land as a filter for further purifying the Sewage?—**I believe that is the right thing to do.**

6089. May I take it that fresh Sewage is not noxious?—Human excreta that have only been discharged for a few hours are not offensive; but I must look at it in this way—that during times of dry weather large deposits take place in all the sewers of every city and of every town, and there they fester and putrify and get into a terrible state of decomposition. Upon the first storm that takes place that is washed away, and

Dr. Henry Letheby. 6th May, 1872.

I cannot see how you can prevent that offensive decomposing matter from causing a nuisance in the tanks at Saltley, whatever engineering contrivances you may adopt. Directly after a storm all these heavy matters and some of the sludge will be washed out. My own analyses have shown that storm Sewage is considerably worse and contains a larger proportion of offensive matter than ordinary Sewage; notwithstanding that it is so far diluted by storm water, from the circumstance that it washes away from the surface all the accumulations that have taken place during the dry weather in the sewers.

6108. Was not that part of the farm which was used as a drying bed?—No; I went on the farm on the 18th January, and I saw them **ploughing it up, and it was so bad that I could hardly endure the smell.**

6112. What would be the effect of draining the land at Saltley and then putting clarified Sewage upon it; would not that do?—I should say yes, when the land gets into a proper condition. I do not believe that **clarified Sewage, under any circumstances, put upon good land would do any mischief.**

6123. If a farmer took it he would take it, not for the purpose of getting rid of the matters in the Sewage for purification purposes, but for agricultural purposes?—Precisely. **I say that Sewage run upon land without being previously defecated by chemicals will be a nuisance wherever it is put on.**

6126. You would exclude that portion of the Bill which allows us to give any of the Sewage, or to sell any of it, to the farmers anywhere within the line of conduit?—**Certainly; until it is defecated no Sewage should be put upon the land.**

6136. **After it is precipitated they may do what they like with it?**—If there is a large volume of water they may let it run into the river, and if there is not, and they choose to filter it, they may take out of it the remainder of the organic matter—that is the safe thing to do—or if they attach

importance to what remains in that defecated water, as Dr. Voelcker does, for he thinks the water is just as good after it has been defecated as it was before. They may use it, if they like, for profitable irrigation.

Dr. Henry Letheby. 6th May, 1872.

6139. So that if it (**the sludge**) is not **taken out** at Saltley, it must be taken out somewhere else?—**Yes, before it is put upon the land, in order that it may be put upon the land so as not to be a nuisance.**

The Select Committee, after fourteen days' patient hearing of the evidence of the leading authorities in Chemistry, Engineering and Agriculture, attached to their approval of the Bill for the purchase of **land for filtration** the condition that—

"No Sewage be put upon any land without having been previously defecated in tanks."

APPENDIX.

On the 15*th* May General Scott read a paper on his Sewage process before the Society of Arts, Thomas Hawksley, Esq., President of the Institute of Civil Engineers, in the Chair. In the discussion which ensued the following opinions were given :—

Mr. F. A. Abel, F.R.S., said "he had looked carefully into the various points of the process, and was particularly struck by the facility and the completeness with which it could be applied to the clarification and the precipitation of Sewage. The process was at that time carried out certainly in no manner advantageous to its success, but the results which he (Mr. Abel) witnessed were conclusive in his mind, as far as the clarification and precipitation went. Further, he examined several of the products which were obtained by precipitating with a mixture, judiciously proportioned, of lime and clay. He examined them, not merely in regard to their power of being converted regularly into a species of cement, but also with regard to the quality of cement, and he found that it was equal to excellent Portland Cement, or in another case to an excellent hydraulic cement of a different character, produced by another method."

Dr. A. Voelcker, F.R.S., Consulting Chemist to the Royal Agricultural Society, said that "having had an opportunity of visiting the works at Ealing, he wished to bear testimony to the fact that the process of drying and manufacturing the dried material into cement could be carried on in the immediate neighbourhood of the town where the Sewage was obtained

without creating the slightest nuisance. The subject brought forward at this meeting in such an able manner by General Scott was one of very great importance, not only to town authorities but also to agriculturists; for he had come to the conclusion that agriculturists would never use Sewage if they had to take it in the foul condition in which it had hitherto been delivered to them. But he was convinced that if Sewage properly clarified were offered to the farmers, they would take it, and would find it a very useful liquid for irrigation purposes." "In all the clarification plans which had hitherto been put in practice, whether they were the Lime, or the Sulphate of Alumina, or the Phosphate Sewage process, very little, comparatively speaking, of the precipitating agents had been used, for obvious reasons—reasons of economy. Now, in General Scott's plan, a very large proportion of earthy matter—Clay and Lime—was used, because the object was to bring out a useful product, and it was mainly due to this circumstance that the Sewage slush did not enter into putrefaction." "A little Lime added to organic refuse matters hastened their decomposition, set up putrefaction, and created a very abominable nuisance. But in General Scott's plan a very large proportion was used, and with this was mixed Clay, a material which possessed remarkable absorbing properties." "The consequence was, that any products of decomposition, which no doubt would be formed, were absorbed and retained by the earthy matter. Be this as it may, it was certainly a fact that the material which was obtained by precipitation according to General Scott's plan, could be kept in a wet and pasty condition for two or three months. He had himself examined at Ealing some of the clay and lime sewage mud which had been kept for nearly three months, and he found it had no disagreeable smell." "This led him to the third point, on which he would just offer a remark which perhaps might not have occurred to General Scott. It was this—that the material from which he made cement might be dried in the open air without creating a nuisance. Indeed, he believed it would be found in practice that air-drying would

be the most economical and probably the most efficacious plan of producing a material which could be burnt in a cement-kiln. There was a large quantity of earthy matter mixed up with the material which formed the sewage slush, and the consequence was that it got penetrated by air and dried itself; whereas one of the most difficult things in the world was to dry the deposit obtained by simple subsidence of the sewage slush obtained by the mixture of a small quantity of lime or sulphate of alumina. He knew of no substance which it was so difficult to dry, and consequently, which it was so expensive to dry, as sewage slush; but by General Scott's plan, the deposit, being mixed with much earthy matter, was at once rendered porous, so that by exposure to air it dried itself, and this was a matter of very great importance, for although, no doubt, sewage slush could be dried artificially and burnt, yet there was a great objection to this artificial drying in the expense which had to be incurred. The simple evaporation of the water was by no means a guide as to the expense. These were some of the points which had forcibly struck him as being in favour of General Scott's plan."

Mr. Rawlinson, C.B., said "the mixture of lime and clay was put in such proportions as were requisite to produce the qualities of hydraulic cement." "If that could be successfully accomplished, he did not think it was a pounds, shillings and pence question exactly. There was no process with which he was acquainted by which towns could treat their Sewage so that it should be a profitable concern if they had to get rid of it without the means of putting it, by irrigation, to the land. The towns produced the Sewage; it was a nuisance to the community, and it was necessary to the health of the community to dispose of it, and they must be contented to pay, by a rate in aid, for getting rid of that which was no benefit to them, and which, in its grosser form as discharged from towns, was an injury to the country. The sooner that was understood, and put on all fours, the better it would be for everybody."

Mr. W. Hope, V.C., said "he had listened with very

great pleasure to the paper of General Scott, who had made a very original, and he hoped useful discovery. The sludge was always a great difficulty in dealing with Sewage, no matter by what process or theory."

Mr. Lloyd, Member of the Metropolitan Board, said "the Metropolitan Board were perfectly free and unfettered in any way with regard to the A B C system or any other system of Sewage, and were prepared to treat with that which could be shown to be the best for the benefit of the metropolis. He thought it necessary and fair to make that statement. It appeared to him that there were two great problems to be solved. The first was so to clear Sewage of its impurities that they might be able to turn it into water-courses which carried off the effluent water. It must be so little deleterious that the water-courses would not be injured by it. And the next great problem was, whether the result or residue, if diverted from the water-courses, could be made a source of profit, so as to return something for the benefit of the ratepayers who had paid for carrying off the Sewage. Those were the two great problems which ought to be set before scientific men; and when they had dealt with both in a satisfactory way, the Metropolitan Board and other nuisance authorities in the kingdom would only be too glad to step in and give aid."

Mr. F. J. Bramwell, C.E., said "he did not know that he had much to add to what had been already said upon this subject, except to draw attention to something which General Scott appeared to have omitted from his paper, but which he had communicated to him (Mr. Bramwell) when he had the pleasure of seeing the process at Ealing. He would say a word first of all in reference to an observation of Mr. White, although perhaps it would be doing what Mr. White had asked General Scott to do, viz., to answer a question. Mr. White put it, 'Does the water contain lime, and does the water contain clay?' Now he supposed most Sewage contained lime,

but if it did not, it contained something which everybody was desirous of getting rid of, and that was the gluey, sticky, filthy sludge. That was a thing which everybody had decided ought to be got rid of before the water should go into any channel. That being so, supposing it contained no ingredient whatever to make Portland Cement, but supposing that the materials to cause it to become inoffensive were such materials as made Portland Cement, then you put those in, not because you wanted to make Portland Cement, but because you wanted to make the sludge harmless and inoffensive; and if you could afterwards make Portland Cement, why should not you do so? That he understood to be General Scott's proposition. As the object was simply to do that which he had stated, to get these matters deposited and the nuisance removed, there was a temptation, if they could not utilise the material resulting, to diminish the quantity put in, and thus the Lime process, as Professor Voelcker said, had got into disrepute in a variety of places because it was endeavoured to be carried out at the least possible cost. But if they could, as General Scott had pointed out, get a saleable result, then the temptation diminished, and they got an entire deodorisation." "With respect to the detritus, as Mr. Rawlinson had observed, that came down so rapidly when the settling tank was reached that it came out in the very first compartment, and therefore the fear in Mr. White's mind (that by no possibility could you get the ingredients you wanted because detritus was mixed with them) had no foundation, and we did, in truth, get the sludge unmixed."

Mr. Chas. Jones, C.E., Engr to Ealing Local Board, said "he had closely watched the system for the past six months, and found not the slightest inconvenience from the presence of the deposit. He had seen material turned out by the process which he should pass as first-class cement without the slightest hesitation." "The question of cleaning the sewers was a most important one, and the process certainly had a

very salutary effect in getting rid of the sewer gases; he could now pass through his main sewer without the slightest inconvenience from them." "He (Mr. Jones) believed that in a place with a population of 20,000 persons, double that of Ealing, the scheme would absolutely pay, and that was an important feature in connection with the subject. He had tried experiments with various systems during the last eight or nine years, but he had seen none which had succeeded so well as that which General Scott had introduced."

Dr. Odling, F.R.S., said "that he had seen General Scott's process carried out at Ealing, and he must say that he was very much impressed with it. It appeared to him that whatever might be the ultimate disposal of Sewage, there must be a large number of cases in which it would be desirable to separate the sludge from the liquid matter, and the manner of separating the sludge adopted by General Scott was certainly most complete. Then remained the question in what manner or for what purpose this sludge should be disposed of; and in dealing with that question General Scott had struck out a new line of work. He had availed himself of what Mr. Bramwell had called the 'fuel' in the material, and he had availed himself of its other most valuable constituents, and he had recovered the material with which he effected the process in a form more valuable than it was before it was used. Economically, the scheme seemed to him the most promising of all which had been introduced for the purpose of dealing with Sewage, and throwing down the sludge from it, and then dealing with the solid portion so as to convert it into a useful marketable article."

Mr. P. P. Marshall, A.I.C.E., Engineer to the Local Board at Tottenham, said "irrigation was no doubt one of the best modes of dealing with Sewage, but the plants ought not to be forced with it. An excess of it produced a black mark on the stalk of the plant, which took three weeks to clear

away. He thought that a combination of General Scott's process with irrigation might be a solution of the difficulty."

Mr. R. Grantham said "he had had the means of watching General Scott's process a little. He had sent an inspector from the Committee of the British Association, and they had a favourable account and report of it. At present there was not a good opportunity for making experiments, and he proposed that a further investigation should be gone into. General Scott had given every facility for making experiments. He looked upon it as a very great improvement and advantage if they could get rid of the sludge in some way or other, by drying processes, or by any other means which could be devised. General Scott's plan, as far as he was aware, was certainly the best, and he really hoped that it would prove successful, and be adopted in many parts of the country."

Dr. Letheby said that, 'in common with all who took any interest whatever in this question, he had had a good deal of satisfaction in listening to the paper read by General Scott, not merely because it seemed to offer a practical means of solving a great difficulty, but chiefly because it seemed to him to be the means whereby people of the most opposite inventions, and theories, and practices, might be brought somewhat into harmony. On the one hand, those who were advocates of the precipitating process would find in it the means of carrying out all they wished; and, on the other hand, those who were particularly anxious for the use of the Sewage water or effluent water upon the land, would find an opportunity of using it advantageously." "One other point had struck him during the reading of the paper and the discussion which had arisen out of it, and that was as to the quantity of Cement that would possibly be produced from a given quantity of Sewage. Now, looking at the experience which we had during the days of the old Tottenham works and of the works also at Leicester, it was found in practice that the proportion of solid

matter that was obtained was invariably between four and five times that of the Lime used. He calculated, therefore, that two tons and a half of this Cement would be obtained from a million gallons of Sewage. That would be about a ton for every 10,000 people per day. Well, he did not know what might be the demand for Cement, but it did not strike him at first sight as being a very large quantity. Such a quantity might very well be used in building operations." "He had listened with very great satisfaction to the account of the process, and he fancied and hoped that he saw in it a means by which we should get out of the great difficulty which pressed upon all the towns of England, namely, the economical disposal of the soil."

NOTE.

A Pamphlet, explanatory of General H. Y. D. SCOTT's Process of treating Sewage, may be had on application to

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ON THE

AGRICULTURAL VALUE

OF THE

LIME COMPOUNDS

RESULTING FROM

MAJOR-GEN. H. Y. D. SCOTT'S PROCESS

OF

TREATING SEWAGE.

READ AT THE
MEETING OF THE BRITISH ASSOCIATION,
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1872.

ON THE AGRICULTURAL VALUE OF THE LIME COMPOUNDS RESULTING FROM MAJOR-GENERAL H. Y. D. SCOTT'S PROCESS OF TREATING SEWAGE.

1. The characteristic feature of this process is the *calcination* of the deposit produced in clarifying Sewage by means of lime, and the production therefrom of lime compounds, to be used as cement or for agricultural purposes.

2. The system itself has been fully discussed by the most eminent authorities on Sewage matters, and the application of the resulting compounds to building purposes has been the subject of a paper read at the last conference of the British Architects and published in the proceedings of the Institute. The use, however, of the material for agricultural purposes has not yet been considered.

3. Many attempts have been made, as is well known, to use the deposit from Sewage as manure, but such attempts have been so far unsuccessful, and eminent chemists (Dr. Frankland, Dr. Voelcker and Dr. Odling among the number)

deny that Sewage sludge has sufficient fertilising value to do more than repay the cost of carriage to a moderate distance. The object of this paper is to show that in districts where liming is resorted to it is more advantageous to calcine the deposit produced by the addition of lime to the Sewage water, and use the product in that condition as manure, than to transport it to the fields either in the dried or wet condition, with the view of utilising its organic matter as a fertiliser.

4. In order to make a comparison of the calcined lime deposit, with limes which are generally available, it is necessary to know the composition of the natural limestones of the country.

5. The following analyses were made by Professor Johnstone, with the view of ascertaining the amount of phosphate of lime in the ordinary limes used for agricultural purposes :—

Constituents.	Cockermouth.	Brampton.	Kilnhead.	Carluke.	Borders of Denbigh; used in Cheshire.		Mean.
					No. 1.	No. 2.	
Lime	89.8	89.5	88.6	89.8	73.9	56.2	81.3
Magnesia	1.0	1.9	0.4	1.5	0.8	1.0	1.1
Sulphate of Lime	0.4	0.5	0.5	1.7	0.8	0.6	0.8
Phosphate of Lime	...	0.3	...	1.9	0.2	0.2	0.5
Alumina and Oxide of Iron	1.2	1.8	2.0	2.8	4.2	7.6	3.3
Silica in the state of Silicate	4.9	2.2	3.4	0.7	20.1	34.4	10.9
Carbonic Acid and Moisture	2.7	3.8	5.1	1.7	...	...	2.2
	100.0	100.0	100.0	...	100.0	100.0	100.1

6. Professor Johnstone points out, very clearly, the influence which even such minute quantities of phosphoric acid as are shown in these analyses must have upon the fertility of soils. At page 225 of his work on Experimental Agriculture, he says :—"From one-third of a per cent. "to two per cent. are the limits between which, in "burned limes, the proportion of phosphate of "lime usually varies, according to our present "researches. But, though small, these quantities "are sufficient to produce an important influence "upon the soil to which the limes which contain "them are applied. A ton of lime in which "the phosphate of lime exists in the proportion "of one-third of a per cent. or two per cent. "respectively, contains—

"When the proportion is ... $\frac{1}{3}$ % 2 %
"Phosphate in a ton of lime $7\frac{1}{2}$ lbs.... =45 lbs.
"Equal in common bone dust 15 lbs.... =90 lbs.

"Every ton of lime in the one case, therefore, "carries with it as much of the phosphate as is "contained in 15 lbs., and in the other case as is "contained in 90 lbs. of bone dust. If five tons "of these different varieties of lime be applied, "which is a moderate dose, the one gives to the "land the phosphate of about 10 bushels, the "other of about $1\frac{1}{2}$ bushels of bones"

7. Though no experiments of a practical character have as yet been made to show the value of the Sewage lime, a portion of the deposit

at Ealing (when the process of precipitation by lime and clay with a view to the production of cement is in operation) has been analysed by Dr. Letheby with the following results :—

Organic Matter... ...	16.38	Contains 1 per cent. of $\frac{NH_3}{3}HO$.
Earthy Carbonates ...	49.14	Chiefly lime.
Phosphate of Lime ..	6.13	
Alumina, Iron	8.88	
Silica	19.29	
	99.82	

8. Of the Silica Iron and Alumina in this precipitate, quite one-third was added in the form of clay. Now if we allow for this, and deduct the carbonic acid and the organic matter, the composition of the *calcined material*, such as would have been produced by precipitating with lime alone, would stand thus :—

Lime and Magnesia	51.5
Phosphate of Lime	11.9
Silex Iron and Alumina	36.4
	99.8

9. If we inquire into the effect of adding lime of this composition to an acre of ground, we shall find that for every ton of lime added we shall carry to the soil a quantity of phosphate of lime equal to 535½ lbs. of bone dust, or for a dressing of 5 tons we shall add to the field upwards of 2,650 lbs. of bone dust per acre.

10. It must not be supposed that this result is exceptional, for the following are the results obtained by Professor Way with London Sewage precipitated with 15 or 16 grains per gallon. The Sewage was taken from the Northumberland Sewer :—

	Grains per Gallon.	
	Before Treatment.	Precipitate.
Organic { Soluble	19.40	35.41
Matter { Insoluble Suspended	39.10	
Lime	10.13	14.80
Magnesia	1.42	0.22
Soda	4.01	
Potash	3.66	1.02
Chloride of Sodium	26.40	
Sulphuric Acid	5.34	1.11
Phosphoric Acid	2.63	2.06
Carbonic Acid	9.01	8.92
Silica Sand, Oxide of Iron, &c.	6.20	5.96
	127.30	69.50

11. A precipitate of these constituents when calcined would have the following composition :—

Lime	46.3
Magnesia	0.9
Alkaline Salts	4.0
Sulphate of Lime ...	7 5
Phosphate of Lime ...	17.7
Siliceous matter, &c. ...	23.6
	100.0

12. Professor Way states that five-sixths of the phosphoric acid were precipitated, but so far as our experiments show, the amount of lime he used, viz., 15 or 16 grains, is insufficient to produce proper clarification, and indeed there was found in the effluent as much as 5.19 grains of carbonic acid in solution. Probably had a larger dose of lime been added, all but a trace of the phosphoric acid would have been removed.

13. The proportion of phosphoric acid found by Professor Way seems unusually large, but other experiments by the same chemist give still larger proportions of this acid in the Sewage. For instance, on the 12th April, 1859, in the same sewer and at the same hour, he found the phosphoric acid amount to 5.76 grains per gallon. In the Sewage in Dorset Square he found 4.17 grains, and in that of Barrett's Court the enormous quantity of 10.44 grains.

14. The following are, however, the estimates by various eminent chemists of the average quantities of phosphoric acid found in Sewage water. They are extracted from Dr. Letheby's work on "The Sewage Question" :--

Letheby	1.74
Hoffman and Witt ...	1.85
Way	1.68
Voelcker	1.00
Mean	1.57

The mean of these results would yield in the calcined deposit a quantity of phosphate of lime varying from 10 to 12 per cent., or practically that obtained from the Ealing Sewage.

15. Now, if we assume the ordinary lime to cost 12*s* 6*d* per ton, and insoluble phosphate of lime to be worth £8 per ton, we shall find that the Ealing Sewage lime would have a value as manure of £1 5*s* 6*d* per ton, and the London Northumbd. Sewer lime £1 14*s* per ton. That is to say, in one case the value of the lime put into the sewer would be brought out again with double its original value, and in the other case its value would be trebled; and this takes no account of the value of the sulphuric acid and potash and soda salts, which are present in the Sewage lime in much larger proportions than in ordinary limes, nor of the possible advantages of soluble silica.

16. The idea will naturally suggest itself, that as the organic matter is destroyed in the calcination process, there must be an actual loss of fertilising material, which by careful drying of the deposit is avoided. But it should be remembered that :— 1st. The process I am recommending is analogous to that which the farmer follows when he burns weeds, &c., for the sake of more readily distributing their ashes over the ground. The organic matter still does work, for it supplies the heat for the purpose. In Egypt, indeed, dried excrements are the chief source of fuel, and the fields in the valley of the Nile, which are remarkable for their

fertility, receive no manure except the ashes of the burnt dung. 2nd. If the farmer be asked to buy Leicester Bricks, Tottenham Sewage Guano, or any other of the dried preparations from Sewage deposit, he compares the results they will produce and their cost with that of Guano or other rich manures, which cost far less both for carriage and for spreading, because the Sewage products are generally of a tough lumpy consistency, as well as very weighty in comparison with their fertilising effects. 3rd. The proposition to convert the deposit into lime is suggested for those cases only in which liming is now used, and when, therefore, it will have to compete, not with a material of much less bulk and greater richness than itself, but with one which in comparison with its fertilising properties is much bulkier.

17. So long ago as 1857, and before the futility of the wild notions entertained of the manurial value of Sewage slush began to show itself, it was demonstrated by Dr. Hoffman and Mr. Witt in the report on the Main Drainage of the Metropolis, "That in order to find for a Sewage manure, "similar to the Leicester bricks, a market at a "distance of five miles from the works, the "manufacturer must be satisfied with 12*s* 3*d* per "ton, which is 5½*d* less than the cost of its "production (12*s* 8½*d*)."

18. The results of practice have, however, shown that the manufacturer of this manure had to satisfy himself with a far lower price than

12*s* 3*d*. The Rivers Pollution Commissioners, in their report on the small value obtainable for the manure made on the A B C system, give the value assigned to the Leicester bricks by Voelcker and Versmann respectively as 15*s* 5*d* and 17*s* per ton; and they add, "Such is the value of these "deposits as estimated from chemical analysis; "but experience has warned the manufacturer of "these feeble manures that the value indicated by "chemical analysis cannot be counted on in the "market. Thus the Leicester mud is actually "sold for 1*s* per ton, although its indicated value "is from 15*s* to 17*s*. Indeed, without fortification "with sulphate of ammonia, nitrate of soda, or "superphosphate of lime, such manures are "scarcely saleable."

19. The *fortification* of these valueless manures is now becoming a favorite idea with those who cling to the sentimental notion that the organic matters of Sewage deposit must be utilised as fertilisers;* but since the farmer has concluded, with the chemist, that the sedimentary matters of Sewage will, as manure, scarcely bear the cost of carriage, we may also give him credit for seeing, that if there be any advantage in mixing much worthless matter with good manures before placing them in the ground, he may conduct the

* *The operation of burning could be so conducted as to save the nitrogen if necessary. For centuries Europe derived its chief supply of Sal Ammoniac from the distillation of camel and cow dung in Egypt.*

operation of *enfeeblement* on his own land with materials available on the spot.

20. Another question which will arise will be this:—Can the Sewage Lime be produced more cheaply than an equivalent mixture of common lime and bone dust? My reply is, a nuisance has to be got rid of. The sludge must be disposed of somehow, and by disposing of it as cement, and lime for manure, the best return will be made. As Mr. Rawlinson expresses it, "The "towns produced the Sewage; it was a nuisance "to the community, and it was necessary to the "health of the community to dispose of it, and "they must be contented to pay, by a rate in aid, "for getting rid of that which was no benefit to "them, and which, in its grosser form as dis-"charged from towns, was an injury to the "country. The sooner that was understood, and "put on all fours, the better it would be for "everybody."

21. The really pertinent question is, not—How do your manufactures stand in point of cost with other lime and cement-making processes? But—Is there any other mode of disposing of the slush of Sewage which will repay to towns more of the cost of getting rid of their nastiness?

Proof.]

SANITARY PRINCIPLES

OF

SCHOOL CONSTRUCTION.

BY

EDWIN CHADWICK, C.B.

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SANITARY PRINCIPLES OF SCHOOL CONSTRUCTION.

NOW that unaided new school boards are preparing for the construction of new school-rooms, it is of importance that they should be apprised of the sanitary defects that require amendment in the greater proportion of those existing for the elementary schools in this country. Medical officers of health have concurred in declaring that the common elementary schools, as now constructed and conducted, are the frequent centres of childhood epidemics. Of an excess of upwards of 7000 deaths in the metropolis, and of upwards of 50,000 annually throughout England and Wales, in the school stages of life, were pronounced by them, on the observation of the working of particular schools within their province, to be largely attributable to the structural condition of the school-rooms, and to the modes in which the children are kept in them.

The chief sanitary defects of these schools are, in my view, (1.) Defective ventilation; (2.) Defective warming; (3.) Bad drainage and foul latrines; (4.) Want of means of maintaining personal cleanliness; (5.) Bad lighting; (6.) Bad arrangements of desks and seats; (7.). Want of proper means of gymnastic exercises; (8.) Insufficient, and ill-paved playgrounds. I would submit that it is important that school boards should require, in the competition for plans, that these evils should be first specially considered and provided for, and that the architectural designs and elevations be made of secondary consideration.

I will, in the first place, treat of the warming of the schools, as that largely influences their ventilation. To me, it has always been most painful to observe the condition of children in the common schools, inwinter time, going there in cold and wet, in driving sleet and snow, frequently ill-shod, and commonly ill-clothed—kept in the school with feet and hands painfully cold—fingers often so benumbed as to be scarcely able to hold their slates and pencils; the open fires at one end of the school, not freely to be approached, and when approached, the warming or heating on one side, "roasting in front and freezing behind," so as to give inflammations or colds from the disturbed and unequal circulation. The confinement of the children for five or six hours in such conditions, overtasked mentally, and painfully constrained bodily, are surely evil conditions requiring active intervention for their relief.

One consequence of the defective warming is, that doors and windows are shut to keep out the cold. Then comes the pernicious effect of confinement of the children in the atmosphere polluted by their breaths and by transpiration from their skins, usually unwashed, or only hands and face washed, and from dirty clothes. As a relief, some of the windows are in part opened, and the cold air is let in for ventilation. The corners where this is done have been called "rheumatism holes." Sometimes when the windows are kept closed, the confined air is heated to an extent that creates perspiration, even in winter time. Eruptive diseases are often consequences of precedent functional derangements, and when there are outbursts of epidemics in children's institutions or in large schools, they frequently occur among the children grouped at one end, and the first case observed is a new comer, who has been for a time the centre of the group attacked, the infected breath having been pumped out upon the surrounding children for several days before the eruption has appeared on the new comer. In general hospitals, it is known, that if they are well ventilated, cases of typhus fever may be put in every second or third bed, with an interval of about four feet between each bed. Cases of scarlatina—it is considered as settled—must be placed at wider intervals, as of every seventh bed. But if the ventilation be defective and confined, a foul atmosphere is created which will endanger the nurses. By adequate dilution with fresh air the poison is rendered inocuous. By crowding and additional doses of foul air it is made destructive. Obstruct the ventilation, or crowd the cases still more, and an atmosphere is created which endangers the medical attendants. Thus in the ill-warmed schools, in which windows and doors are kept closed to keep out the cold air, the foul atmospheres, poisoned by the incipient disease common amongst the poor, are created for the children. In some weathers and school conditions, a mother in sending her child to such schools, is sending it into a preparation of fever, or into measle-mixtures, or of small or chicken pock, or of some form of disease. Children, thus infected in the schools, frequently bring the infection into crowded and ill-ventilated homes, where several sleep in the same bed. If surprise is expressed at the sudden extensive outbursts of epidemics in crowded habitations, there is one contributary source of them. Compulsory attendance in ill-warmed and ill-ventilated long time schools is commonly compulsory bodily deterioration. Such conditions endanger, and frequently ruin, the constitutions of teachers. It is proper to mention, as respects the higher class of female schools, boarding schools as well as in second-class schools, that great pain is inflicted, and bodily disorder occasioned by heads kept heated by unduly protracted mental labour, and feet kept cold by bodily inaction.

By graded schools, as I have shown, especially by half-time schools, three children may be taught well in half the time in years, for the expence now commonly incurred for teaching one comparatively ill. The school board for London have set an important example in the adoption of large school organisation. But such provisions

entails the necessity of sanitary precautions, for if they be neglected, especially as respects the classes of children to be brought in by compulsion, considerable bodily injury will frequently be occasioned. I submit that the first object is to improve the method of warming as involving the method of ventilation.

Of the modes of warming, those by hot water pipes and iron surfaces are of inferior, and sometimes, when for high heats, are of pernicious effect, and are very expensive. Besides, they are apt to warm only the sides of rooms, or the upper parts of them, and to leave the feet cold, unless an inconvenient and objectionable degree of heat is created over the whole room. It is, moreover, matter of considerable experience that warming by earthenware surfaces, or stone surfaces, especially by heat diffused over wide earthenware or concrete surfaces, is more agreeable and more salubrious than any warming by iron surfaces.

Observing some ragged boys at night grouped upon a particular street-pavement, and apparently enjoying themselves, in very inclement weather, I found that the pavement on which they were assembled was warmed by a baker's oven beneath. It is observable that market women, with a foot warmer, sustain very inclement weather. The like facts, which I might multiply, appear to me to lead to the conclusion that there are no means of applying warmth, that are so economical as by applying it to the feet. There is extending experience of this in the use of hot water bottles, and vulcanised-macintosh hot water bags.

The class of facts on this topic lead me to recommend that we should adopt the practice of floor warming are displayed in the remains of villas found in the chief seats of their occupation in this country. Their hollow floors were mostly made by square slabs of stone, or of large tiles, supported by stone pillars a foot or eight inches high, or more, set upon a lower stone floor. The upper floors were covered with concrete, and often ornamented by tessera. Some of their hollow floors in this country were evidently warmed by coal, from the remains of coal soot, in others they were warmed by wood. The fireplace, for the coal-warmed flooring, was mostly a small cylinder of red earthenware, containing a mere hatfull of coal, through which the air was led by a down-draft, through the hollow of the floor, the draft being created by an upcast flue, on the side of the chamber opposite to the fireplaces; the tall chimney-flue acting as the longer leg of an inverted syphon. In some of the largest Roman contructions of this species, the heat appears to have been led underneath the long, distinct channels. But in some the warming was by the diffusion of heat through the floors, amidst the uprights, which, I conceive, would be done by low heat, led slowly, but long applied.

I have been unable to get any detailed accounts of the Chinese methods of construction for the purpose, and I shall be much obliged to any one who will give me some, but the testimony is strong and decided that the floor-warming there is the most comfortable

that has been experienced by Europeans. Marco Polo, the early traveller, notices it as extraordinary. The warming is effected with a comparatively inconsiderable amount of almost any sort of fuel.* I am informed that in the barracks in China, constructed on the English principle of the open fires, men were frost-bitten, whilst the Chinese, with their mode, were perfectly unharmed. The Army Sanitary Commission of the United States adopted the principle of this method of warming for field hospitals. A trench, covered with wide slabs of stones, was led from one end of the tent to the other. On the outside, at one end, a fireplace was sunk at the mouth of the trench; at the other end a chimney was erected of clay, held together by empty barrels piled on end. In this way a draft was created underneath the stone floor of the tent, warming it in the most equable and agreeable manner. Americans, attached to the ambulance corps, applied the same principle, with complete success, to the warming of the field hospitals in Paris. General Duff, of the United States Army, informs me that he applied the principle, by rough and ready methods, for the warming of field tents for his soldiers. The abuse of the method of warming will obviously be in getting up unduly high heats for the whole of the air of a room. The warmed floor, in its proper use, however, appears to me to have the peculiar advantage in enabling a colder and thence more condensed air, a better quality of air breathed than any heat-expanded air.

To those who have not had occasion to attend to the subject, it may be observed that if a given quantity of air, with a given

* A later traveller, Father Ripa, says, "By the European method of warming houses, our heads may be hot while our feet are cold, whereas, in Pekin, the feet are always well warmed, and a moderate heat alike pervades every part of the room. Wood is very scarce, but there are mountains in the neighbourhood which appear entirely composed of coal, like that of England, and this is the fuel in general use. While I was living in Pekin, some Muscovites arrived, who had never been there before. They built themselves stoves of the European kind, supposing they were to be preferred, but, soon perceiving their error, they pulled them down, and adopted those of the Chinese. They likewise discovered that the expence of heating their own stoves exceeded that of the Chinese a hundred-fold, for, in their own, they were obliged to use a great deal of wood, which, at Pekin, is exceedingly dear, whereas the cost of fuel for the Chinese stove is a mere trifle, the coals being very cheap, and the chimney not more than a foot square, and two deep. In the southern part of China, the land being universally cultivated, there is but little wood, and, as the expense of conveying coals would be very great, dry leaves, grass, weeds, and even the dung of animals, are used for fuel." The timber flooring in use in England obstruct the application of the principle; but Mr. Alfred Beaumont, when exercising his profession as an architect, applied it with perfect success to the warming of the stone floors of several offices, and without smoke, dust, and dirt, and a great economy of fuel. He says, "A perfect combustion having extracted the whole of the caloric from the fuel, the next point is to secure the delivery of the caloric in the apartment to be heated, and there only. This is done by extending the smoke beneath the floor of the apartment, desired to be heated, for such a length as shall deliver all the heat from the draught, save and except just enough to carry the draught up the chimney. In these ways, all the caloric producible from the fuel is distributed only in the place desired to be heated," (in the large offices he led it to the standing places of clerks, at a distance from the fireplace) "and a required degree of warmth of the purest kind is enjoyed.

quantity of oxygen, at a given temperature, be expanded in bulk by best—say by a fourth—the inspirations of the lungs must be quickened in proportion, to obtain in the same time the same quantity of oxygen. In newly warming the *Palais de Justice*, at Paris, a warmed surface was placed for the feet of each judge. If the warmth were applied to the whole body so as to raise it to the same temperature given by the foot-warmer, the air breathed being more expanded would, I consider, be inferior in quality for the health.

Before it became a practice to use foot warmers in railway carriages the passengers were accustomed to close the windows as completely as they could. Since foot-warmers have been introduced windows are allowed to be more widely opened.

The effect of foot-warming is then to enable the body to sustain, with less discomfort, the impact of cooler currents of air. Foot-warming will, of itself, allow of doors and windows to be opened with less annoyance, and of itself will be conducive to freer ventilation. Indeed, Mr. Blackburn's method of ventilating cattle sheds, by an open diapragm along the roof, would, in some instances, suffice. In many others I would propose, in addition to the warmed floor, the introduction of open fireplaces, on Captain Galton's principle of warming with air pumped in that is fresh, as well as warm, and the more active removal of vitiated air through the smoke chimneys.

I have long advocated the principle of floor warming, but I find it expedient to propose particular means for the purpose, which I will describe hereafter, as architects may not have access to plans of the Roman methods of floor-warming.

Next to the foul air from overcrowding, and from the breath and from transpiration, there is the foulness arising from congregation of dirty skins as well as of dirty clothes. Medical officers who have to do the work of vaccination with children of the lower and middle class, are aware of how small is the proportion of them who are ever properly washed, and how painful, and, at times, how dangerous, is the duty of operating upon numbers of them consecutively in confined rooms. The great sanitary success of the district orphan schools is largely due to the daily ablution of the children, and to the cleanliness maintained in the clothing as well as on the persons. On visiting the Central District School I always found the female children's pinafores most perfectly clean, as if they had just come fresh from the mangle. On expressing a doubt whether this was not a luxury of cleanliness, I was corrected by the answer :—that 300 soiled pinafores made an appreciable difference in the atmosphere. The answer expressed the sanitary principle of the importance of cleanliness—clean clothes, clean skins, clean air—as proportioned to the numbers aggregated. But the massing of numbers together, however cleanly, would be in some stagnant conditions of the atmosphere, injurious, even if they were massed together in the open air. Troops marched in close column carry their own atmosphere with them. In epidemic periods it has been found that the pro-

portion of attacks has been diminished by marching them in open columns or widely apart. People faint in crowds, not from the pressure of the crowd but from the atmosphere generated by the crowd. Of course this evil is aggravated by filthy personal conditions. In one ragged school the health of the teacher was frequently overcome by the stench of the scholars, and fever was frequent and rife upon them. In self-defence he forced the boys to wash in an adjoining room; but this thinned his school, for the washing was with cold water. Cold water washing is found to be a mistake in district schools where the children are under control. The circulation of children of the poorest classes is very low, and cold water is peculiarly painful to them;—besides, washing with water which is hard as well as cold does the work of washing imperfectly. It has been found that tepid water is necessary for the purpose. The master of the ragged school to whom I have referred as having failed when he insisted upon the pupils being washed with cold water, got steam passed through the water and warmed it, and he then succeeded. The washing ceased to be disagreeable;—indeed it was made, as it always ought to be, agreeable; and the scholars came, the atmosphere became tolerable, and fever was reduced, if not entirely abolished.

In the larger children's institutions, where children are boarded, the effects of progressive sanitary improvement have been distinctly marked. In one, where the death-rate had been about twelve per thousand, the foul air from cesspools and bad drains was excluded, the latrines were amended, and the ventilation was improved, when the death-rate was reduced to eight in a thousand. Next, regular tepid ablution, and, in summer time, cold water bathing, and careful skin-cleanliness was introduced, the death-rate was reduced to four in a thousand.

If you go into even first-class elementary schools in England whilst simultaneous class-teaching is going on, you commonly see dirty hands held up. If you go into a school of the like class in Holland, you see very clean hands held up. There, the moral, as well as the sanitary duty of personal cleanliness, as far as I saw of it, is well maintained. The children in the female schools are from time to time examined, and the duty of maintaining the cleanliness of their children is enforced upon the mothers. If any mother is frequently negligent, marked observations are made upon her, which are unpleasant, and they are avoided. By due exertion in this direction, the object is very generally obtained. But there are cases where the children have no proper mother's care. In some places, the poor people are absolutely destitute of the means of cleanliness, or of proper supplies of water. Accidents constantly occur to little children, and they fall down in the muddy streets, or dirty themselves in playing. To deal with these cases, there is, in well appointed schools in Holland, usually a female attendant on the schoolmistress, some old woman, who takes the dirtied children into an apartment and washes them, the schoolmistress herself being of an occupation of a quality above such service.

On such experience, it is to be insisted upon that every elementary school should be provided with a retiring-room or closet, with warm water, with the proper appliances for the cleansing of children. It is a provision of a very high order of importance for the infant schools of the lower districts.

Of the lessons they may be taught in schools, the practice of cleanliness is of the highest order of importance. The clergy who neglect to enforce the precept "wash and be clean" fail in the enforcement of Christian duty. A filthy population is everywhere a low moral population, but it is futile to enforce the duty in the absence of proper appliances for its practise. Of these all large schools should have one bath for teaching and practising swimming. For ordinary schools a swimming bath 30 ft. long by 10 ft. wide and 3 ft. deep may be made to suffice, and it should be constructed for about 50*l*. But for one of the larger schools, there should be a bath 60 ft. long, and 25 ft. wide, and 3 ft. deep, which should be made for about 200*l*. Besides, in crowded districts several schools might be united for the use of one swimming bath in turns, as well might be united for the use of one swimming bath in turns, as well as for one drill ground. The objection to such appliances on the score of expense is an objection to the means of economy, for all efficient sanitary appliances are means preventive of waste. The general economical waste of productive force in this country, as I have expressed it, is as if a farmer, in order to obtain one working horse, had to raise two colts, and as if the horse, when raised, had only half its natural and proper working ability. The economical fact should be inculcated that a pig that is regularly washed puts on a fifth more flesh, and that flesh of a better quality than the pig that is unwashed; and that the same rule holds good with washed, as against unwashed children. Five washed children may be sustained, on the food requisite for four that are unwashed, to bring them up to the same condition. Besides, the washing itself is preventive of infections and of contagions, such as the itch and other diseases.

In the proper working of a school, with a due regard to the principles of physiology, as well as of psychology,—to the body, as well as to mind, the children ought not to be kept long together. The reduction of school hours to the proper time for efficient teaching, which is demonstrated to be half the usual school time, is in itself followed by marked reductions of non-attendances on account of sickness. They should, moreover, whensoever the weather permits, be turned out frequently into an open space or playground for exercise, and in fine weather for lessons. Much may be said for the Irish hedge-row schools, as against the dens in which English children are frequently kept.

The common playgrounds for children are either the natural soil, which is very dirty, or a gravel, which is sharp and wasteful in the excessive wear of shoes and clothes; children fall down upon it and seriously bruise or lacerate themselves, and the sharp grit gets into their eyes or the lungs.

In one institution, where the managers could not be induced to

improve the children's playground, which was of gravel, until after the prevalence of opthalmia, when it was flagged, or paved with York landing. It was then found that a saving of one-half the shoe-leather was produced by the new paving. But the paving with York landing is very expensive. A Val de Travers asphalted paving would be little more than half the expense, and would, with its peculiar elasticity of feel at the surface, serve much better. A tile paving, with concrete or celenite tiles would be cheaper still, and these tiles, with the lock joints I have proposed and shall hereafter describe, would have the peculiar advantage of not being disturbed by "hop-scotch," or any other form of play. In Germany, smooth concrete paving is used, with considerable saving of shoe-leather. Where very good smooth paving, of the quality in question is laid down, I do not see the necessity of children, or at least those of the poorest class, kept in public institutions, wearing either shoes or stockings in dry summer weather. If the feet be regularly washed and kept clean, I question whether they would not be better bare at such times. In Scotland children travel barefoot to school in all weathers, or carry with them their shoes and stockings which they put on there, dry, in which there is reason.

Miss Nightingale in her "Sanitary Statistics of the Colonial Native Schools and Hospitals," observes, on the necessity of the careful consideration of habits, as recorded in one of the returns from the Natal schools—"It might be supposed that one of the most obvious duties in bringing children to school would be to clothe them. But, nevertheless, clothing an uncivilised child requires care. In their natural state they expose themselves to torrents of rain, which runs off them, and they are easily warmed and dried in a hut fire. But it is stated that when clothed in flannel and jersey they get chilled by the rain, and pulmonary diseases come as a consequence." A closet for drying clothes should be provided in elementary schools. Captain Johnson, one of the Queen's messengers, has advocated the use of sandals for soldiers, made of matted flax, such as are in use with great advantage by the peasants in the Basque provinces. In those close neighbourhoods in urban districts, where there is absolutely no space for playground to be got, a flat roof should be constructed for the purpose, as is done with excellent effect in one large school near Long Acre.

As the efficiency and economy of teaching, by a division of educational labour amongst trained masters in graded schools, requires the children to be gathered from wider areas than heretofore, often from considerable distances, it will often be necessary to make provision of food for them. In the great middle class school of the City of London, it has been found requisite to provide cheap dinners for those boys who do not bring their food with them in what the Rev. Mr. Rogers the governor calls their "nose bags." In the great metropolitan Jews' school, which provides for 1700 children of the poorest class of Jews, and which is, in very important respects, a model of educational administration, I found that of its leading supporters, the Baron Lionel de Rothschild and the Baroness, of

their own munificent educational grants, have been accustomed to bestow on that one school 800*l.* per annum, to provide a portion of bread and some milk for the very destitute and necessitous children, to enable them to attend. On this subject my excellent and experienced colleague, Mr. Edward Tufnell, in writing to me on part of my draft paper, observes:—

"In many schools the children bring their dinners, usually miserable enough, and eat them between twelve and one, when there is an interval of school. Now, I think every school should have a small cooking apparatus, in which some girls should be taught to cook cheap soups, stews, &c., and then the children, girls at least, should be kept in school, and given dinners so cooked, which might be done, as I have ascertained, at a penny a head, the parents paying. I mention girls chiefly as they have often nowhere to go to between twelve and one, their parents being out at work, houses locked, and thus in London at least they run about in the streets, and sometimes get violated,—as I find from the reports of the Rescue Society. Hence you might kill three birds with one stone,—teach plain cookery,—make the children sit down to their dinners in a Christian-like way,—save the honour of the girls from the dangers of the streets, and the apparatus could easily be made to supply sufficient warm water to wash their faces and hands."

Of course I heartily concur in this suggestion, and can speak of the need of such a provision to keep boys as well as girls from the peculiar dangers of bad associations in the streets.

There is yet a very frequent and serious defect in the construction of the common schools, which requires to be guarded against, namely, the bad distribution of light. From a paper transmitted to me by the excellent sanitarian, Dr. Varrentrapp, of Frankfort, it appears that from the insufficiency of light, and from the bad distribution of light, in the schools in Germany, nearly a third of those who remain in them during and beyond the secondary stages, are subjected to short-sightedness. Professor Leibrich, our most eminent oculist, tells me that the injury is always done by the front light, and that the light, should always be got in from the left side, and that in towns where such light cannot be obtained, it should be got as the next best from the back of the desk, and never from the front. A great deal of distortions and curved spines are, as Dr. Varrentrapp shows, occasioned by the wrong adjustment of seats, a topic, as well as others of the wall colourings and school fittings, beside my immediate purpose. I consider, that schools ought to have more of window space; of windows made with double or with very thick glass, which is economical as saving heat, and is, moreover, advantageous, as lessening the transmission of sound from the streets.

For the reasons which now prevail in respect to the walls of properly constructed hospitals and cottages, the walls of schools should be made of impermeable materials and be washable, and of a proper colour.

The evils common to the schools of this country, are transplanted

to our colonial possessions. In few of these schools, as Miss Nightingale observes, "is any attempt made at combining the elements of physical education with the school instruction, and even where this is done the measure is partial and inefficient, being confined to a few exercises, or simply to bathing. The obvious physiological necessity of engrafting civilised habits on uncivilised races, appears to be nowhere recognised, except at New Vorcia (Benedictine) School, Western Aussralia, on the return from which there is the following very important statement, Gymnastics are stated to be necessary to prevent sickness, and the reporter proceeds, 'The idea of bringing savages from their wild state to an advanced civilisation, serves no other purpose than that of murdering them.' And the result of the out-door training practised at this school, is said to have been hitherto successful "in preventing the destructive effects of this error."

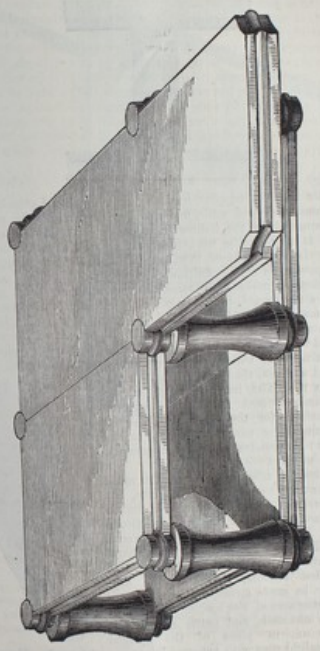
Enough has been stated to show that the school, properly considered as an efficient implement for training the young, is not the mere barn with an architectural elevation, according to the common conception, but for the avoidance of serious evil as well as for the attainment of the requisite good, is an implement which must be carefully fashioned by the best practical sanitary science. Enough too has been stated to show the deplorable state of the central administration,—which, having received warning from school inspector after school inspector, and also from the medical officers of health in the metropolis,—which, having the aid of a very expensive medical council, passes over these evil conditions unheeded and unprovided for in the school plans issued as models for local boards, and sends additional masses of children into those insanitary conditions, in violation of clear laws of psychology as well as of physiology. Surely some action ought to be taken for the public protection in respect to such an administration!

With the advantage of some practical suggestions by Mr. Canon Cromwell, the principal of St. Mark's Training College, I have directed a plan of one school, with the primary requirements, to be got out by Mr. Samuel Sharp, the architect, for 500 children, with what I must call the Roman floor warming by hollow tile floors, and with solid concrete walls, with a lavatory, but without a swimming bath and without a playground, would be within the cost of the common constructions.

I will now describe the tile and the support, with which I propose to effect the important object of floor-warming efficiently and economically.

The tile forming the hollow floor, may be of concrete, or of earthenware, or of slate, to be tongued or rabetted at the sides, so as to fit into each other, and, when cemented, not be easily shifted, or so as to obstruct the passage of highly warmed air or smoke, if accidentally loosened. The upright supports are made with tongues to lock in at the corners of the tiles.

The following is a sketch of a hollow floor, with the tiles in position, on the principle of the Roman hollow floors:



The following is a section of another form of support, by a cross tile upright pillar, with its junction in the tiles :

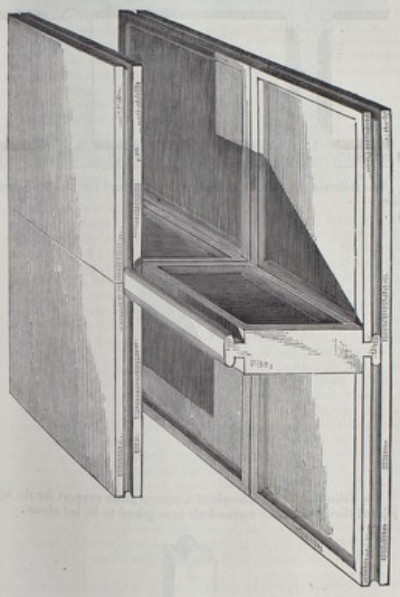


The tile and the support used as a cross-tie will, I submit, serve for the construction of walls, and attain more perfectly the sanitary ends I proposed for the hollow brick construction of the walls of houses. It may also be used for roofs as well as walls, in which case iron ties are to be used to give it cohesion, and iron uprights for bearing power, on the Crystal Palace principle. If walls of ordinary construction be made with non-absorbent surfaces, there may be sometimes unpleasant condensation on such surfaces, because they will be sometimes colder than the dew print of the air. If, however, contact of the outer air with the inner part of the wall be prevented by the interposition of a layer of confined air, the inner surface of the wall will never be much colder than the air of the room, and will not, therefore condense moisture from it. The inner glass of double-paned windows does not become covered with hoarfrost for the same reason — the inner pane being nearly as warm as the inner air; it remains clear when common panes are obscure.



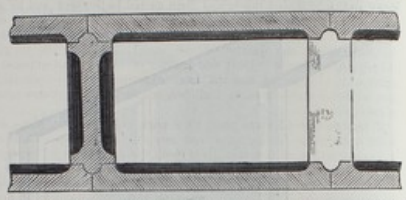
The tiles, for this purpose, may be made of earthenware as well as of concrete, but most cheaply of concretes which require no burning, and most readily receive exactitude of form. With about one sixth or seventh of good Portland cement, or with General Scott's new preparation of lime clay and sand, called *celenite*, tiles and the supports may be made stronger than the common building stones. For leading the warmed air in any direction, and better diffusing it on admission, in place of the upright pillars, upright tiles with rabetted joints may be used. The above displays the longitudinal upright position.

The following gives a view of the same tile, in position for the hollow floor :

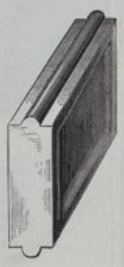


In some cases, in the place of tiles with rabetted joints, tiles with overlap joints may be found eligible, for the application of rapid second mechanical vertical pressure in construction.

The following is a cross section of the supports on this principle



The following is the form of the tile support for the lap-jointed tiles:



The following is an example of a square pillar support for the lap-jointed tiles, where the warmed air is required to be led about:



The concrete tiles may be moulded in the yard, and kept to harden there, and to be tested there, and then carted to the spot and be set up rapidly, without any other mechanical process there. The advantage of the tile construction of walling is, that with the cross-ties included, about one quarter of the material will suffice to give the requisite strength. Only one quarter of cartage and expense of conveyance is required, and the total expense of the construction, iron supports and cross-ties included, is less than the common cost of construction.

If earthenware tiles are used, they pack closer in the kilns, and closer and lighter for carriage than any solid materials. The form and construction of the tiles gives them the maximum of strength, of density, and non-absorbency or dryness, with the minimum of material and of weight. Some of the advantages of the hollow wall construction of tiles, in respect to non-conductability of heat, are like those of the double window—they will be cooler in summer and warmer in winter.

One advantage of the tile construction is, that from the very considerable saving which the plan effects in the *material*, a proportion may be given to the improvement of the tile. Its flat shape admits of power being applied at a ready and cheap rate by a second pressure when the material is half dried, to give it great density of substance and exactitude of form. With this second pressure they may be made absolutely non-absorbent, and to throw off driving wet as well as ascending wet, and may be made absolutely damp-proof. The inner tiles would be washable on the surface, in itself an important sanitary quality. They may be coloured of any colour that may be deemed suitable, and that with a great economy over the usually unwashable paper and absorbent plaister. By these means the warming and, indirectly, the ventilation, may be most cheaply and efficiently provided for. When these tiles are made with the accuracy of form and of joints that is attainable by proper applications of mechanical power, they might almost be jointed up close dry; and in any case they will require a very small amount of cement, and may easily be separated for cleansing or any other purpose, or for the entire removal and rapid changes of whole structures. As respects floor-warming, it is to be observed, that the down draft from the fireplace occasions a great amount of smoke consumption. In many of the Roman remains of hollow floor-warming, there appeared to be no provision for opening up the floor for the removal of the soot, which would appear to be considered too little to be cared for.

A better conception of the eligibility of the principle of construction proposed, will be obtained by examining and considering the specimens of the tiles, rudimentary as the specimens produced yet are. The ends sought and the chief advantages claimed for them may be thus summed up—Giving maximum of strength and durability of each tile, with the minimum of material;—a maximum of defensive power for shelter at a minimum of cost; a cheap and salubrious

means of diffusing warmth in winter, and of defence against excessive heat in summer;—giving non-absorbent and washable interior surfaces, defensive against vermin and noxious deposits;—means of cheap and permanent washable colouring and ornamentation; facility of transport, rapidity of construction and alteration; cheap, and dry, and smooth surfaces for playgrounds. In the selection of materials for the tiles, those of the greatest non-conducting power are of course to be preferred. The common tiles and bricks being usually absorbent of moisture, are rapid conductors of heat, and when we were consulted at the General Board of Health, we advised that they should not be allowed, but only wood for the floors of schools, inasmuch as the common tiles, instead of giving warmth *to* the feet, aggravated the evil in question by taking warmth *from* the feet. I take it that the foremost authority on ventilation, from the long and impartial attention he has paid to it, and the trial he has conducted, is my colleague of the Institute, General Morin, and he has given decided testimony on trials in favour of Captain D. Galton's warming and ventilating chimney. I propose to submit to the General, and solicit his opinion, this method of floor-warming, as to the modifications it may require in connection with that important instrument, the chimney ventilator, which I have got successfully applied in some model cottages. I need not specify the various constructions to which the principle in question and the means of applying it will be applicable.

TWELFTH ANNUAL REPORT

OF THE

LIVERPOOL

LAND & HOUSE OWNERS' ASSOCIATION,

22nd DECEMBER, 1871.

WALTER PIERCE, President and Solicitor,
Castle Chambers, 26, Castle Street.

OWEN WILLIAMS, Treasurer, 32, Castle Street.

JOHN MURPHY, Secretary.

OFFICE—
Clarendon Rooms, 11, South John Street.

COUNCIL FOR THE YEAR 1872.

H. S. Alpass,
Joseph Atherton,
H. C. Below, Esq. J.P
Ephraim Brunt,
Joseph Boult,
Richard Brown,
G. M. Byrne,
J. W. Braithwaite,
Thomas Cobb,
Isaac Denton,
William Evans,
Wm. Owen Elias,
Richard Edwards,
John Grierson,
F. G. Hanbord,
Joseph Huntington,
Wm. Hargreaves,
Joseph Herson,
John L. Jones,
Ralph Leyland,
Richard Lyon,
Edward Mounsey,
Timpron Martin,
M. R. Moldenhauer
William M'Caig,
Edward Neep,
William Parry,
J. A. Picton, Esq. J.P
T. E. Priest,
Joseph Parry,
Samuel Quilliam,
Owen Roberts,
Robert Roberts,
Henry Rook,
James Rowe,
William Spelman,
James Underhill,
O. Williams.

LIVERPOOL:
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1872.

LIVERPOOL LAND AND HOUSE OWNERS' ASSOCIATION.

(Extended from the Liverpool Mercury *of December 23, 1871.)*

The Annual Meeting of this association was held last evening at the Law Association-rooms, Cook-street. Mr. Walter Pierce, president, occupied the chair. A letter of apology for non-attendance was read from Mr. Councillor Woodburn, who said he thoroughly concurred in the principles upon which the association was based.

From the report it appeared the labours of the council of the association during the year had been very great—perhaps greater than in any previous year. The financial state of the association was very satisfactory, as all liabilities were now discharged, and there was a small balance of upwards of £4 with which to begin the year. The report dealt largely with the recent Reports of Drs. Parkes and Sanderson, which showed that the owners of property had not been to blame for the unhealthiness of the town. The filthy habits of a semi-barbarous and drunken tenantry had not been created by landlords. It was surely not unreasonable now to hope that wiser counsels would prevail to induce the authorities to adopt broader views and truer notions of justice in

all future sanitary arrangements than had been dealt out to property owners in the past. The report then referred to the Liverpool Improvement Bill, Local Taxation, Lodgers Protection Bill, Property Tax, &c.

The CHAIRMAN said he had much pleasure in presiding that evening at the twelfth annual meeting. It was a source of considerable gratification that he could speak very confidently of the satisfactory condition of the Association; as it advanced in the role of time its importance and influence was being felt and acknowledged. This was encouraging, especially so considering the almost insurmountable difficulties which from time to time the Association had had to contend with. These favourable results were largely attributable to the energy, zeal, and unceasing labour of the Council, who, by their industry and perseverance, had ultimately placed the Society in its present position. One of the chief features of the twelfth annual report was the reference to Drs. Parkes and Sanderson's Reports on the sanitary condition of Liverpool. On reviewing them it would be found that the opinions of these gentlemen as to the causes of the high death rate in the town, and the various recommendations for the removal of these causes, are very similar to those urged from time to time by this Association in its annual reports, memorials, petitions, and by deputations to the Sanitary authorities of the town. To the remonstrances so frequently made against the despotic demands of the Medical Officer, and the costly expenditure incurred under his rule,

the authorities paid little or no attention, and the result had been that the owners of property and the town generally were put to a very heavy expense for really no practical benefit in a health point of view. The immense sums of money thus literally thrown away is a serious loss to the community, and he (the Chairman) feared that probably nearly as much more would be required to remedy the evils occasioned by the action of the Health Committee. He (the Chairman) would remind members that he had frequently on their behalf proposed to adduce independant medical testimony before the Magistrates, in order to show that the course taken by the authorities was wrong; and, had the Justices received this evidence a great deal of the valuable information contained in the reports of Drs. Parkes and Sanderson would have long since been in the possession of the Town Council. He need only refer to the generally expressed opinion of the most eminent medical men that typhoid fever is germinated and distributed through our dwellings by the poisonous gases escaping from the taps, pipes, vents, and machinery connected with water-closets; and that the prevalence of this disease, almost unknown in former days, and the unhealthiness of the town, were too surely attributable to the mistaken policy of the Health Committee. It behoves, then, the members and the public to strengthen the hands of the association in order that it may have the means at its disposal to watch the progress of Bills in Parliament, and check the enactment of unjust laws. He (the Chairman)

said he would only very shortly refer to the other important questions mentioned in the Annual Report. The worst features of the Liverpool Improvement Bill, 1871, were struck out, and other clauses modified before the Committee of the House of Lords. The Local Taxation Bill was the subject of a public meeting promoted by the association, and also the Lodgers' Goods Protection Bill. The Property Tax question and other matters engaged the attention of the Council. In conclusion he had to remind the members that, to enable the association to bring its influence to bear on future legislation, and to further the interests of property owners, all subscriptions should be paid to the Secretary as early as possible. Every endeavour should be made by each member to induce his friends and acquaintances to become members, and thereby contribute to the prosperity and usefulness of the association. It is now out of debt, and it depends upon the exertions of each member to keep it so.

Mr. Beloe, in rising to move the adoption of the Report, regretted that the association had not hitherto taken that prominent place in the town to which it was eminently entitled. There was no doubt a disposition in the Town Council to sneer at the efforts of the society, but this feeling was rapidly disappearing, more especially since the society had enjoyed the advantage of having for President a gentleman whose admirable manners, added to his legal ability, tended much to bring about success

in any negotiation between the two bodies. He (Mr. Beloe) had been a member of the association since its first formation, and had read its Reports with great interest and advantage.

Allusion had been made by the Chairman to the Reports of Drs. Parkes and Sanderson. He (Mr. Beloe) confessed he had read that most able document with deep humiliation, because it was humiliating to find that the Town Council had had to send to London and Southampton for men of eminence to teach us that the system of drainage adopted by the Town Council was all wrong, and that certain foundations which had been condemned by the medical and engineering authorities were harmless.

He could sympathise with his brother house-owners in the desponding feelings which they entertained as to the value of their property, so much at the mercy of the Health Committee. To mention one case—he had purchased, thirty-two years since, a model property, in the north end of the town, not a court but a square. The houses were tidy, the people were tidy, and landlord and tenant were pleased with one another. For the first fifteen years all went well. Then came orders to put the water taps into the cellars, then the necessary connection of every cellar with a drain. Then the whole court, at a frightful expense, because of its large area, had to be flagged. Then the middens, after several costly improvements, had to be circumvented into trough-closets—and the result of all this expense is that the court is now a *fever nest*; and he had sold it

only last week, and escaped the responsibility of owning any such property. (Cheers.)

He trusted the town would not submit to the dictatorial dogmas of physicians and engineers. (Cheers.)

The motion was seconded by Mr. Owen Williams, who said the question of Local Taxation was one which ought to be fully ventilated, and urged that a public meeting should be held, previous to which they should have a conference to find, if possible, some common ground of action. The report was unanimously adopted.

Mr. MURPHY (secretary) read the treasurer's statement, which showed that the receipts had been £127 18s., and the expenditure £123 3s., leaving a balance in hand of £4 8s. 4d.

Mr. W. Pierce was re-elected president, Mr. O. Williams treasurer, and Mr. John Murphy secretary for the coming year.

After the usual votes of thanks the proceedings terminated.

REPORT.

—:o:—

FROM this, the Twelfth Annual Report, it will be seen that the labours of the Council have been very great—greater, perhaps, than in any previous year.

The Council have great pleasure in directing attention to the present financial state of the Society, which may be seen on referring to the account at the end of this Report. All liabilities are now discharged, and there is a small balance in hand to begin the next year with. The Members, doubtless, will be glad to find that the Council have had it in their power to make a payment to the Solicitor, in consideration of the valuable services he has rendered since his connection with the Association to those members who have had to appear before Assessment Boards, the Police Courts, and the Health Committee on matters having reference to property.

Your Council are desirous that all the members should understand, that arrangements are entered into with the Solicitor, by which they can avail themselves of his services in the Police Courts, at Assessment Boards, and otherwise, on matters connected with property without any charge to them. And members are particularly requested to avail themselves of his services as much as possible; they have simply to wait upon him at his office, No. 26, Castle-street, whenever his assistance is desired.

During the last year the Solicitor's services were required in the Police and other Courts in 46 cases, in most of which he was successful.

During the past year Professor Huxley was requested by the Town Council to name two gentlemen to come to Liverpool and furnish a report on the sanitary condition of the town and the

admirable reports which they have furnished are alike creditable to the Professor, and to Drs. Parkes and Sanderson, who undertook the enquiry.

This Association was brought into existence mainly by the waste and reckless manner in which the public funds were being administered, and it is remarkable how the views propounded by the Land and House Owners' Association from time to time in their Memorials to the several Committees and the Town Council have been verified in these Reports. This Association for instance has for years opposed the tapping of the sewers too freely and thereby letting the sewer-air into houses through pipes from sink-stones, baths, housemaids' closets, water-closets, wash-houses, &c., as well as by bringing drain-pipes from sewers to drain areas, &c. And very many owners of property have been ruined, and others annoyed in almost every conceivable manner, doubtless with the view of reducing the high death-rate, in being compelled to make alterations and changes in their properties. Now it is admitted that the chief causes of the high death-rate are traceable to the immorality, the drunkenness, and the poverty of tenants, in many instances self induced. Your Council have asserted this over and over again in their Memorials; notwithstanding which, owners of property were often compelled to do something else at a very great expense to themselves—often to construct drains, to let sewer air into dwellings.

Your Council submit the principal features in these Reports for the consideration of the Members, as they consider them of very great importance to owners of property in particular.

Your Council believe that the principal value of the reports seems to be in showing how important it is that the Borough Engineer of a town like Liverpool should be very well informed on scientific subjects. For the want of scientific knowledge it would appear that the Health Committee have been acting in the dark, and causing immense sums of money to be expended out of the public rates, as well as by private individuals, in consequence of the Borough Engineer not having made experiments such as those detailed in these reports. Had he done so many fears would have been allayed, and hundreds of thousands of pounds would have been saved to both the public and private owners of property. Your

Council understand that the new Borough Engineer's principal recommendation is, that he is a scholar, and is well-skilled in scientific questions, besides being an excellent practical Engineer.

REPORTS OF DR. PARKES AND DR. SANDERSON ON THE SANITARY CONDITION OF LIVERPOOL.

In June, 1871, these gentlemen forwarded their reports upon certain matters which had been referred to them for investigation, by resolutions of the Health Committee, in the following order:—

1.—The present practice of filling up with ashes land intended to be built upon.

2.—The state of the drains and sewers, especially with regard to their ventilation, and of the privies, water-closets, and ash-pits.

3.—The system of scavenging now adopted.

THE CINDER DEPOSITS.

Much ignorance seems to have prevailed upon this subject. Many attributed much of the high death-rate to the building of houses on cinder deposits. For the want of exact information, such as that supplied by Drs. Parkes and Sanderson, the newspapers and public speakers have been creating groundless fears in the public mind, for there is little or no danger to health resulting from building on these cinder deposits; and, if there ever was danger it seems to pass off after the first two or three years. From the Reports it appears that the maximum of danger is during the first year after deposit, less during the second, and little or nothing after the third. The following is an extract from their Reports:—

"Potato and other vegetable, and probably animal matters, become then first coated over with fine cinders, and are soon made inodorous till crushed; after eighteen months they lose their character but are still offensive; while, after two years and eight months they are farther changed and lose all odour. In three years potato and all vegetable matters of that kind have entirely decayed away."

"We conclude, then, that the process of decay of all the most easily destructible of matters is completed in three years."

"With respect to the influence of this cinder refuse on the health of persons inhabiting houses built on it, the evidence is very defective."

"As it certainly does not produce any one special disease it would be impossible without prolonged and careful comparison of the health of those living on it, and of classes of the same rank and occupation living on other soils, to give any opinion. For such a comparison there are no materials, and we are obliged therefore to fall back upon general principles. We can have no doubt that from a soil formed of such cinder refuse and gradually decomposing, some effluvium must be given out which would be likely to pass into houses placed on the soil; and, therefore, that on the general principle of requiring and enduring purity of air, such a soil is objectionable, at any rate when first laid down."

Then the Report further states that, "As cinder refuse decays and disappears in about three years, and is virtually innocuous before that time, we recommend that places filled up with cinder refuse, should not be built upon for at least two years from the date of the last deposit."

From the above extracts it will be observed, that the odours in vegetable and animal matters are locked by the coatings of cinder refuse, and that the danger arises, if any, as the result of building upon such deposits within a year after they are made. Your Council believe that the instances are very rare indeed of houses being commenced within a year or two after the last deposit is made. And if commenced directly after the last deposit it would be nearly a year before such new houses would be built and tenanted. Your Council regret that Drs. Parkes and Sanderson did not follow up their inquiry by visiting the tenants in those houses most recently built on cinder deposits. As there are not many houses built in any one year it would be an easy matter to examine the state of the health of every inmate of them. And it would not be a difficult matter to make a comparison with the state of health of persons similarly circumstanced and of much of the same kind of occupations in other localities without cinder deposits.

Your Council believe that it would be found that persons in houses built on cinder deposits would be found to be healthier than those in houses built on other soils. If this deduction be correct, it must be of the greatest importance to ratepayers, in an economical point of view, as there is a disposition to take the

cinder deposits to the neighbourhood of Hilbre Island, instead of depositing them much nearer Liverpool. If it would be injurious to health to build on cinder deposits in Liverpool it would be alike injurious to build upon them near to and outside of Liverpool. And owners of land would be quite justified in refusing to allow cinder deposits to be placed on their lands, if the result would be to injure their property.

CHEMICAL REFUSE.

From the want of exact scientific information many are of opinion that the high death-rate of Liverpool can be traced, in some considerable measure, to the practice of filling up land with chemical refuse. But the following are extracts from these reports upon this branch of the question:

"In some of the houses built on ground made of this refuse the smell of sulphuretted hydrogen is distinctly perceived, and is a source of great discomfort. On enquiry we found that the gas entered the houses from the sewers and did not pass up from the ground below."

And then the Reports state—

"We are of opinion that in those parts of the town in which the houses are built on chemical refuse the public health is not likely to be injuriously affected by the fact. For, apart from the sulphuretted hydrogen, there is nothing in the soil which can affect health; it is entirely mineral, and if any animal or vegetable matters should pass in, they would be destroyed by the lime. And as the evolution of sulphuretted hydrogen only occurs under certain conditions, health will not be affected if those conditions can be avoided."

Your Council feel that these two extracts must have a very beneficial influence in allaying the fears of the large section of the population who reside in houses which are built on what is popularly called chemical waste, for, it appears, that nothing injurious to health finds its way into houses from the soil on which houses are built. But disagreable smells are detected in some houses from the sewers. The disengagement of this gas is produced by contact with acid liquids which are derived mainly, if not exclusively, from certain chemical works situated between Vaux-

hall-road and the Mersey. And it is recommended that the sources of the acids should be discovered, and that acid liquids should be prevented from entering the sewers. Now that this is pointed out that which is recommended is the most natural thing to do. And your Council consider it very remarkable that the Borough Engineer or some Member of the Health Committee did not discover this simple remedy long ago. At one time it was almost a foregone conclusion that a very large number of the houses built on chemical refuse would have to be uprooted. Now the owners of the property, as well as the occupiers, will feel greatly relieved by the valuable information contained in these Reports. This is an additional reason why the Borough Engineer should have an extensive acquaintance with science.

VENTILATION OF SEWERS.

Your Council, on perusing this part of the reports, are very much impressed with the great loss which the ratepayers have been put to in consequence of the absence of scientific knowledge. Complaints are made that the access to the sewers is so difficult; and, it appears, that the late Borough Engineer recommended proper side entrances being constructed to them. But your Council are at a loss to know why they have not been made. Certainly the ratepayers would never have objected to an expenditure upon a matter so necessary had it been properly brought forward and pressed upon the attention of the Health Committee.

The question of the ventilation of the sewers is fully discussed in these Reports. A few years ago it was discovered that the air in the sewers was in a very bad state,—notwithstanding that it had been insisted upon for years previously to the contrary by those in office,—and thousands of pounds were expended in fixing up a great number of the Archimidean Ventilators; and so little of the foul air do they dispose of that their influence on the movement of the air in the sewers is so trifling as to be practically unworthy of consideration, because their size is out of all proportion to the work they are supposed to perform. Practically the movement of air in the sewer is so small that, except in the immediate neighbourhood of the outlet, it cannot be measured by the most delicate instrument. Your Council feel that

this fresh evidence of the want of scientific knowledge must be startling to the heavily-taxed owners of property, as well as to the ratepayers in general. How came it that experiments were not made before the Archimidean Ventilators were fixed up?

CLOSURE OF THE OUTLETS.

Your Council are glad to find that this question is most ably discussed and disposed of in these reports, in which it is stated that most of the sewers pass under the docks, and, at every state of the tide, are effectually closed against the passage of air into them, excepting in extremely low tides. It has been thought that this state of things, instead of being advantageous, is dangerous, because it interferes with the ventilation of the sewers. Experiments have been made, proving that the occlusion of the outlets nor the fluctuations of the tide exercise any influence whatever on the ventilation of the sewers; and that this phase of the question does not deserve any consideration in the matter of increasing the death rate.

DISCHARGE OF WARM WATER INTO THE SEWERS.

Your Council have noticed that this custom is condemned in the reports. The practice of discharging warm water into the sewers accelerates putrefactive decomposition of their contents, and alters the barometic pressure between the interior and the external air. The putrefactive process will go on much more rapidly in the sewer with water at a temperature of 60 to 80 degrees Fahr. than in a sewer of the temperature of the air; and further, the development of living beings of low organisation will take place more rapidly and in greater abundance than under any ordinary conditions. Then the Reports as the result of experiments state that on the whole there was a preponderance of in-draught to the sewers; that the in-draught at the inlets is due to the down-draught in the sewers; that the pressure on the interior of the sewers suddenly rises; that the air, aqueous vapour, and gases it contains, are forced out by the readiest outlets into the houses; and that, as the practice prevails pretty extensively, it should be prevented. From this section it would appear that there is an

in-draught of air into the sewers, that the "blowing off" of boilers into the public sewers is practised very extensively, and that it must be evident if it enters in it must get out of the sewers by some means. Since the sewers are mostly under water at the outlets, it seems a fair inference to make that the foul gases are forced into dwellings, by which disease and death are produced, doubtless, in very many instances. But your council would caution the reader to be careful not to attribute to the sewer-air more disease and deaths than it should really be made answerable for. Drs. Parkes and Sanderson have given great attention to this aspect of the question. They selected Bispham, Sawney-Pope, Addison, Lace, Henry Edward, and Adlington Streets as fair tests, examples, and for observations, and their words are, "what exact share the sewer air, when it enters houses, plays, we cannot tell. No doubt it helps in the result, but we must also admit that the returns for four years of the deaths in the selected streets do not give any striking evidence of the prevalence of diseases, such as enteric fever or fatal diarrhœa, which are often traced back to the effluvia from sewers. Then in this return of enteric fever and diarhœa it is impossible to trace any bad effect of sewer air; but, if we suppose that cases of enteric fever were returned as "simple continued fever, then 4748 persons gave annually eight deaths; so that, even if these were all cases of enteric fever, the proportion would still be trifling. We have, then, no hesitation in saying that in these six selected streets, the usual diseases which are the test of the presence of sewer-air, and only in efficient drainage, were present to a very small extent. And it is also stated in the same reports that "even a fractional contamination of the air of a sleeping room is almost certain to produce disease sooner or later," and they recommend "that there should be no air communication whatever between inhabited houses and sewers and drains."

Your Council believe that this is a most valuable recommendation. For several years in various ways—by deputations, memorials, and otherwise—this Association pressed upon the Town Council and Health Committee the imprudence of tapping the sewers so very freely, that sewer air might get into courts, areas of houses, as well as into the houses themselves. Now, doubtless, as many drains as possible will be cut off from

houses, because the Reports state—"We regard the prevention of the entrance of sewer air into houses as an object paramount to every other in importance. And the house drains in many of the courts open into the cellars, and the traps are often in such *bad condition* that practically the house and sewer are in direct communication." It will be noticed that the "direct communication is attributed to the "bad condition" of drains. But your Council humbly submits that all houses are in direct communication more or less, even those in the best condition, by reason of the water in the traps being fouled so rapidly by the gas in the sewers. And when the water in the syphons is changed, and becomes as offensive as the gas, sewer air cannot but enter houses. It is very much to be regretted that experiments were not made in a few instances to test this feature; some members of your Council have seen some made. Had Messrs. Parkes and Sanderson made experiments it is almost certain that the following would not have been written by them—"There is practically no danger of the entrance of sewer air into any house of which the stone ware pipe service drain is properly constructed, and closed at the inlets with ordinary water-traps in good order."

Since sewer air is so very dangerous to health it must be clear that it is of the utmost importance that the foul air should be got rid of as quickly as generated, and that the pure air should enter the sewers instead of the foul gas expelled. If the air in the sewers be kept pretty pure, even if some should force its way into houses it will be less powerful for destroying life. And, with the object of keeping the air in the sewers pure, the Reports recommend that spacious and lofty shafts should be erected as a very effective means of getting rid of the foul sewer air. Had there been a scientific engineer at the head of affairs several of such shafts would have been now in existence, instead of the cost of them having been expended upon the Archimidean ventilators now erected in various parts of the town, demonstrated to be of little or no value, in consequence of their diameters being out of all proportion to the sizes of the sewers. Then the reports recommend that there should be no inlets whatever to drains within the houses, which your Council believe to be a most valuable recommendation, and which should be acted upon.

THE DEATH RATE QUESTION.

The second part of Drs. Parkes and Sanderson's Reports deal principally with the mortality of Liverpool, and makes some practical recommendations as the result of their examinations. They appear to have conducted this part of their enquiry in the most searching and careful manner. Many tables are given showing the death-rates in Liverpool as a whole; in separate districts of the town; and in some streets, as well as tables showing the death-rates in other places, for comparisons. So that the condition of Liverpool in the light of these tables is brought out in the most striking manner.

The mean death-rate for the 10 years ending 1870 was 38.59. In the same 10 years the annual mortality per 1000 of the population in Bristol was 22.5; London 24.3; Hull 24.9; Bradford 26.2; Sheffield 27.2; Leeds 28.0; and Manchester 30.2. Liverpool has therefore a far higher average mortality than any of the above large towns.

The ordinary annual mortality in Liverpool in years not marked by any epidemic disease, is about 35 per 1000 of the population. In the years with epidemic outbreaks it may amount even to 50 per 1000, or 1 in every 20 of the population. The doctors ask why Liverpool should be less favourably placed than Bristol, London, or Hull? The ordinary high mortality of Liverpool is not distributed over the whole town. There are districts where the mortality may compare favourably with any town in England, while in other districts the mortality reaches sometimes a most alarming height. In those districts where the death-rate is low, we have positive evidence that it is not an insalubrious climate which is the cause of the high mortality of Liverpool. The difference must be traced to locality.

An important table shows that out of 100 children under 1 year of age only 5 die annually in Rodney-street, whilst 58 die in Lace-street, 40 in Sawney Pope-street, and 30 in Adlington-street.

Another table is given showing the mortality of children under 5 years of age. In round numbers out of 100 children, 4 die annually in Rodney-street, 10½ in Egerton-street, 11½ in Henry Howard-street, 12½ in Addison-street, 13 in Adlington-street, 14 in Bispham-street, 16 in Lace-street, and 26 in Sawney

Pope-street, clearly showing the enormous death-rate of children. The difference between Rodney-street and Sawney Pope-street is astounding. Of every two deaths in Sawney Pope-street, one is a child under five years of age. In Bispham-street the proportion is even higher, giving two deaths nearly of children to one of persons over five years of age.

A table is given showing the mortality in some London streets as compared with those of Liverpool. There are streets in Liverpool as healthy as some of the finest squares in London; also there are streets in St. Giles, London, which have a mortality equal to many of the Liverpool streets, though not approaching the mortality of Addison and Sawney Pope Streets.

The mortality of children under five years in St. Giles assumes relative proportions as great as in Liverpool, and, doubtless, from the same causes, the difference being that in Liverpool there is a large relative proportion of streets with high mortality, while in London the mean mortality of the whole city is reduced by the preponderance of healthy streets in districts.

Another table gives the causes of death of children under five years of age, which tell their own tale to all medical men. A large number is put down to atrophy, debility, and convulsions, indicating unmistakably the greatest neglect and maltreatment on the part of the parents; while the high death-rate from acute affections of the lungs indicates as certainly insufficient clothing, exposure, and the effects of breathing fœtid and poisoned air. It is thus very evident that these parents are not only poor, but careless, ignorant, and, probably, barbarous in their modes of life. The part which drunkenness of parents plays in causing the deaths of so many children may be better inferred than stated.

The great death-rate of Liverpool is therefore in some measure owing to the great mortality of children. But this will not account for all, as the mortality is in excess at every age, both in comparison with all England and with the healthy districts in England. An instance or two will illustrate this: At 35 years of age, when life is most vigorous, 1000 persons of that age in the healthy districts of England lose only 10 lives in a year, whilst Bispham-street loses 20, Adlington-street 34, and Sawney Pope-street 44.

At 45 years of age, in the healthy districts of England, only 12 die out of 1000 persons, whilst 57 die in Sawney Pope-street, 62 in Addison-street, and 29 in Henry Edward-street. The great causes of mortality in these streets are lung affections.

THE SANITARY CONDITION OF THE SELECTED STREETS.

With regard to the want of cleanliness in these houses the Reports state that nothing could exceed the dirt of the people and the foetid condition of the atmosphere at night. How human beings could tolerate such a state of things would be incredible if we did not know the deadening influences of custom. And it is almost impossible, sub-let as the rooms are in most of these houses, for the people in one room to be clean while others are dirty. They give up the attempt in despair.

The Doctors state that the only clean houses we saw in these courts were those in which only one or two families lived.

The causes of the foetid atmosphere are the effluvia due to filth of the persons and clothes; the exhalations from the untrapped drains and wet filthy floors of the cellars; the excretions of the skin and lungs which are not removed by ventilation; the effluvia from fish and other food; and the dirt of the walls, floor, and furniture, when there is any. With regard to the people and furniture of these houses, they were not at all prepared either for the wretched appearance of the people, or for the terrible aspect of poverty disclosed. They could not have believed that in any town in this country they could have gone into room after room, and house after house, and have found in so many cases literally almost nothing but the bare walls, a heap of straw covered by dirty rags, and possibly the remains of a broken chair or table. In London, and every large town, such rooms may be found, but the peculiarity of Liverpool is that they are so numerous.

They were much struck by the want of cooking utensils. The inmates depended for the means of rudely cooking what food they could get, consisting chiefly of fish and bread, when we visited the houses, on a neighbour's kindness. Many persons had no change of clothes, and occasionally only washed their hands and faces at the tap.

The causes of this condition of the people are attributed to the irregularity of the labour market, the improvidence and careless habits of the people, especially the Irish, and the great intemperance. Many of them at once attributed their condition to drink. Others admitted it on being pressed. Their informants, who have the fullest information on the habits of the people, say, decidedly, "that drink and immorality are the two great causes of the mortality."

Drs. Parkes and Sanderson express themselves strongly, that water-taps should be taken out of cellars because they necessitate drains to carry off water, and the houses receive sewer-air in consequence of broken traps. What exact share sewer-air has when it enters houses in destroying life it is difficult to say; no doubt it helps in the result, but the returns for four years of deaths in the selected streets do not give any striking evidence of the prevalence of diseases such as enteric fever or fatal diarrhœa, which are often traced to the effluvia from sewers. Without denying some influence to sewer-air, "we are thrown back on the other causes of foul air in the houses to principally account for the high mortality from lung diseases which are, in our opinion, quite sufficient."

Exposure to cold, improper and insufficient food, and the breathing of highly impure air, are evidently the main causes of the mortality of children, arising from the ignorance, neglect, and, in many cases, drunkenness of the parents.

The excessive mortality in persons over five years of age is mainly caused by diseases of the lungs, which proceed from the foul atmosphere of the houses in which the labouring population reside, insufficient clothing and scanty food, the result in many cases of intemperance or of irregular employment.

To make Liverpool as healthy as it ought to be, surface overcrowding should be lessened. In other words, there should be effected some displacement of the population, which, of course, could not be carried out, except at a great expense, "but we may safely say that no expense can be so heavy as that produced by a constant yearly mortality so great as that which prevails in Liverpool."

CONCLUSIONS.

1.—Many have been of opinion that the cinder deposits contributed largely in increasing the death-rate; from the reports of Drs. Parkes and Sanderson this does not appear to be the fact.

2.—Also, there has been a strong conviction in the minds of many that houses built on that which is popularly called Chemical Waste are unhealthy; these reports show that the waste is mostly mineral, and that the lime in it destroys animal and vegetable life, so that the houses are not unhealthy.

3.—The reports show that sulphuretted hydrogen does not find its way into houses from the ground on which they are built, but from the sewers, which may be prevented by insisting that acids be not allowed to enter the sewers from works or manufactories.

4.—It is found that the Archimedean ventilators are valueless, as the movement of the air in the sewers is much the same whether they are at work or stopped; the money expended upon them had better have been thrown into the Mersey, because some other remedy would have been sought for.

5.—The outlets of the sewers are invariably under water; it is now satisfactorily explained from experiments made that the public health is not injured thereby.

6.—The Reports disclose that even a fractional contamination of the air of a sleeping-room by sewer air is almost certain to produce disease sooner or later; that in the six selected streets the usual diseases which are the test of the presence of sewer air were present to a very small extent, though the entrance of sewer air into many houses was quite certain; it is recommended that the entrances into the sewers should be made on the outsides of houses that access may readily be had to them; and that connections between sewers and houses be made as seldom as possible.

7.—It is recommended that the sewers be ventilated by large shafts, and by other modes.

8.—The Reports are most emphatic against warm water and steam being allowed to enter the sewers, because putrefaction and animal life are encouraged thereby, and are certain causes of sewer-air entering houses more readily.

9.—That the great death-rate is accounted for by the foul air in houses, caused by the filthy habits of the inmates, their dirty and very insufficient clothing, and the filth of the floors and walls; whilst others of decent habits, and in similar houses, being able to occupy a house for themselves, without over-crowding, were in comparative comfort.

10.—The reports disclose that the great and excessive death-rate of Liverpool must be mainly traced to drink and the immorality of the lowest of the population.

11.—That surface over-crowding should be lessened by some displacement of the population.

12.—That any state of things which indirectly throws the responsibility of cleanliness off the tenants must be wrong. And that the inmates who allow a house to become filthy ought to pay for it, and not the owner.

13.—The want of a small jet of light in the Trough Closets is the cause of the filthy state of the seats; the cause is not that stated by the Doctors in their reports. The Health Committee should experiment on a few of them for a short time.

Above are the general conclusions arrived at by Drs. Parkes and Sanderson, and the several branches alluded to in them are ably treated in the Reports. Your Council were invited to appear before them to give evidence, which your President and other members did, and the following is taken from the Reports published by the Doctors, namely:—

"In an interview which one of us had with the Land and House Owners' Association, a strong opinion was expressed by some of the members of the Association that the habits of the people are very much dirtier now than they were in 1847. At that time the cleanly poor would insist on a dirty person removing from a court, and the owners of property were obliged to compel them to leave for fear of losing their other tenants; but now that sense of cleanliness seems lost even by the English, who were formerly very clean. This increasing dirtiness is attributed to a great extent to the increasing poverty and intemperance; but, in addition to these, another cause was assigned. It was stated (by Mr. Owen Williams) that the owners are now powerless to compel their tenants to keep

the houses clean, and even in some cases to pay their rent. If they attempt to do so the tenants go to the Health Officer, and in a few days the owners receive notice to clean the houses. It was alleged by the Members of the Association, that the owners are thus put to such an expense, that they no longer dare to interfere with the tenants, and the opinion was expressed that the houses of these poor classes would be much cleaner if the owners, as in former times, were allowed to look after their tenants at their discretion.

"Whatever may be the facts as regards this, it seems clear that any state of things which indirectly throws the responsibility of cleanliness off the tenants must be wrong. The inmates who allow a house to become filthy ought to pay for it, and not the owner, who may have little control over his own property. The keeping the houses in sanitary repair is another matter."

Before leaving this part of the subject your Council cannot but remark that there is nothing in the reports of Drs. Parkes and Sanderson which show that owners of property have been in any way to blame for the unhealthiness of the town. The filthy habits of a semi-barbarous and drunken tenantry have not been created by landlords.

It is surely not unreasonable now to hope that wiser councils will prevail to induce the public authorities to adopt broader views and truer notions of justice in all future sanitary arrangements than that dealt out to owners of property in the past.

THE LIVERPOOL IMPROVEMENT AND WATERWORKS BILL, 1871.

Your Council have again to express their regret that the Town Council appears so often in Parliament promoting improvement Bills, as the cost to the ratepayers is always something very serious. It is very fortunate for the ratepayers that the Corporation attempted so much in their Bill, because it begat an amount of opposition which proved sufficient to destroy features in the Bill which, if obtained, would have seriously affected their interests. Your Council, with the means at their command, did their utmost in various ways to protect the interests of owners of property. Three memorials were presented from

this Association to the Town Council, pointing out defects in many clauses, many of which were amended, others struck out of the Bill, whilst their efforts failed in removing other clauses, nearly all of which were struck out of the Bill in the House of Lords, to whom a petition was presented by several influential owners of property. By the Bill it was attempted to prevent low buildings in narrow streets, most of which are near the Town Hall, being built higher, the effect of which would have been very seriously to reduce the value of property in those streets. Your Council caused a public meeting to be held in the Law Association Rooms, presided over by the President of your Association, which was numerously and influentially attended. Upon this feature of the Bill being pointed out, some owners of property in those streets, as well as others, entered into a subscription, and resolved to oppose the Bill before the Committee of the House of Lords, which they did by counsel instructed by Mr. Walter Pierce. The case of the Corporation was considered to be so outrageous that even the cross-examination of their witnesses was sufficient to break down their case without any witnesses of the opponents of the Bill being called. Your Council do hope that the defeat which the Town Council sustained last session will be a lesson to them, and deter them from spending so much of the public funds in parliamentary contests.

LOCAL TAXATION.

Your Council were favoured by numerous, voluminous, and very important reports on Local Taxation, the gift of William Rathbone, Esq., M.P.; and the Association is again indebted to that gentleman for the courteous attention which he displayed in London to their interests, and in presenting a number of blue-books, bills, and acts of parliament to the Association. In the Bill brought into the House of Commons it was proposed to shift one half of Local Taxation from occupiers and to place it on owners, which greatly alarmed your Council, who caused a public meeting to be held at the Law Association Rooms, which was respectably attended, and presided over by your President; P. H. Rathbone, Esq., Edward Whitley, Esq., Joseph Boult, Esq., and others took part in the proceedings, when it was resolved to petition Parliament against the Bill

and to suggest that commerce should contribute to Local Taxation through the Property and Income Tax, or by grants from the Consolidated Fund as is now done towards the Watch and Police Rates as well as to School Boards. The petition was presented accordingly. But the Bill was withdrawn last session, which, doubtless, will be re-introduced in the coming session. As this is a question of the greatest importance to property owners, it is incumbent on them to be liberal in their contributions, that your Council may be in a position to assist in preventing wrongs being inflicted on them. This doubtless is a question which requires that deputations should go up to London, which means an increased expenditure. With an increased income your future Council may do much to prevent hardships being inflicted by changes in the law.

Your Council, as the members are aware, have given the question of Local Taxation great attention, and they have considered whether the question of Local Taxation should be collected on the principle of the Property and Income Tax. From the evidence of Mr. Lucas, Surveyor of Taxes for the Borough of Liverpool, it is found that a rate of one penny in the pound collected within the Parliamentary Borough of Liverpool on Schedules A, D, and E, produces **£47,855**; in the Parish of Liverpool **£40,492**; whilst one penny in the pound on the basis of the Poor Rate within the Parliamentary Borough of Liverpool gives only **£7,821.** Since Mr. O. Williams, a member of your Council, read a paper on Local Taxation at the last meeting of the British Association in Liverpool, great progress in the consideration of the question has been made. The Committee on Local Taxation appointed by the Town Council, have now completed their Report, from which it is found that the Town Clerk, the deputation from the Tradesmen's Guild, and other gentlemen who gave evidence, are of opinion that Local Taxation should be collected on the principle of the Property and Income Tax, though there are differences of opinion as to the machinery that should be used in its collection and administration. Your Council press that the next step will be immediately taken by Mr. P. H. Rathbone, the chairman of that committee, and hope that he will forthwith take the opinion of the Town Council as to the desirability of going to Parliament for a Bill, as the object desired can only be attained by exceptional legislation so far as Liverpool is concerned.

THE LODGERS' GOODS PROTECTION BILL.

At the same public meeting the provisions of this Bill were taken into consideration, when it was resolved to petition parliament against it, and especially against that feature in it which provided that exceptional legislation should be granted in favour of agricultural districts. The petition from your Association was the only one presented against this bill throughout the country. And the bill was considerably altered. Now lodgers are required to pay to their principal landlords any arrears they might owe for rent in cases of distraint for rent, and the feature of exceptional legislation is struck out of the Act.

The petition to the House of Lords was sent up to Lord Derby for presentation. His lordship unfortunately happened to be absent from London, which delayed the presentation. On learning that the petition had been delayed, your President wrote to Lord Derby concerning it, and his lordship replied as follows:—

"KNOWSLEY, PRESCOT,
Aug. 13, 1871.

SIR,—I lose no time in answering your letter of the 11th, received this morning. I perfectly remember your sending me a petition, and I feel certain that I presented it, together with some others, on Thursday last. The Bill having come from the Commons, and been passed by the Lords, as I understand to be the case, nothing can now be done, except to watch its operation, with a view, should it work badly, to obtain its repeal.

W. PIERCE, Esq. I remain, your obedient Servant,
DERBY."

Lord Salisbury was also asked to present the petition in case of the absence of Lord Derby. The following is his lordship's reply:—

"LORD SALISBURY presents his compliments to MR. MURPHY, and much regrets that the petition should not have reached him in time for presentation to the House of Lords, before the report on the Lodgers' Goods Protection Bill was received. He fears there will be no possibility of checking the Bill at present, though it is very doubtful whether its provisions have been sufficiently considered, with respect to the interests which they will affect."

Your Council regret exceedingly this miscarriage, as it is clear that Lord Salisbury might have had greater consideration given to

the clauses in the bill had there been time. The bill was opposed in the House of Commons by your Association as well as in the House of Lords. It will be recollected that bills were very much hurried through both houses, and especially through the Lords, towards the close of the Session, and the bill in question was one of those which had not full consideration or justice done to it. But your Council did all that could be done under the circumstances to get it fairly before their Lordships for consideration, in the hope of having it rejected. W. Rathbone, Esq., M.P., presented the Petition to the House of Commons.

As the Act is of great importance to all owners of property, your Council give it a place in this report. Now that this innovation is made on the rights of property it is recommended that your future Council should devise means, through a short Act of Parliament, by which owners of property may obtain readier possession of their property by ejectments.

AN ACT TO PROTECT THE GOODS OF LODGERS AGAINST DISTRESSES FOR RENT DUE TO THE SUPERIOR LANDLORD.

Whereas lodgers are subjected to great loss and injustice by the exercise of the power possessed by the superior landlord to levy a distress on their furniture, goods, and chattels for arrears of rent due to such superior landlord by his immediate lessee or tenant.

Be it enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present parliament assembled, and by the authority of the same, as follows; (that is to say,)

1.—If any superior landlord shall levy or authorise to be levied a distress on any furniture, goods, or chattels of any lodger for arrears of rent due to such superior landlord by his immediate tenant, such lodger may serve such superior landlord, or the bailiff or other person employed by him to levy such distress, with a declaration in writing made by such lodger, setting forth that such immediate tenant has no right of property or beneficial interest in the furniture, goods, or chattels so distrained or threatened to be

distrained upon, and that such furniture, goods, or chattels are the property or in the lawful possession of such lodger; and also setting forth whether any and what rent is due and for what period from such lodger to his immediate landlord; and such lodger may pay to the superior landlord, or to the bailiff or other person employed by him as aforesaid, the rent, if any, so due as last aforesaid, or so much thereof as shall be sufficient to discharge the claim of such superior landlord. And to such declaration shall be annexed a correct inventory, subscribed by the lodger, of the furniture, goods, and chattels referred to in the declaration; and if any lodger shall make or subscribe such declaration and inventory, knowing the same or either of them to be untrue in any material particular, he shall be deemed guilty of a misdemeanor.

2.—If any superior landlord, or any bailiff or other person employed by him, shall, after being served with the before-mentioned declaration and inventory, and after the lodger shall have paid or tendered to such superior landlord, bailiff, or other person the rent, if any, which by the last preceding section such lodger is authorised to pay, shall levy or proceed with a distress on the furniture, goods, or chattels of the lodger, such superior landlord, bailiff, or other person shall be deemed guilty of an illegal distress, and the lodger may apply to a justice of the peace for an order for the restoration to him of such goods; and such application shall be heard before a stipendiary magistrate, or before two justices in places where there is no stipendiary magistrate, and such magistrate or justices shall inquire into the truth of such declaration and inventory, and shall make such order for the recovery of the goods or otherwise as to him or them may seem just, and the superior landlord shall also be liable to an action at law at the suit of the lodger, in which action the truth of the declaration and inventory may likewise be inquired into.

3.—Any payment made by any lodger pursuant to the first section of this Act shall be deemed a valid payment on account of any rent due from him to his immediate landlord.

4.—This Act shall not extend to Scotland.

THE PROPERTY TAX.

Your Council presented a petition to Parliament last session

showing the great injustice done to owners of property; in many instances they pay as much as from 6s. to 8s. in the pound as Property Tax on the nett amounts received by them, whilst mortgagees and those who receive dividends or interest from railways, consols, dock-bonds, &c., pay only fivepence in the pound. Your Council are of opinion that owners of property should pay only on the nett amount of their incomes, the same as all other contributors. Your Council were advised by S. R. Graves, Esq., M.P. not to press the question during the last Session in consideration of Parliament being so fully occupied with business. And it is hoped that your next Council may see their way to send up a deputation to the Chancellor of the Exchequer on this important subject.

PERPETUAL GROUND RENTS.

Your Council, having deliberated upon this important question, prepared a memorial to the Town Council, recommending the system of Perpetual Ground Rents for adoption instead of the present mode of granting leases, because all corporate income under the Perpetual Ground Rent system would be divisible within the year; because the land, and the land only, would always belong to the Corporation; because all the materials placed on the land would always belong to those who placed them there—or their representatives; because the builders of houses and other property would sink less capital than under the present system of building on freehold or Corporation leasehold; and because house-rent would be much lower to occupiers under the Perpetual system than by any other mode, which is, from a sanitary point of view, a matter of the greatest importance. The Perpetual system was recommended for adoption by the late John Stewart, Esq., Samuel Holme, Esq., and by Robertson Gladstone, Esq.,—no mean authorities on such a question. A copy of the Memorial presented to the Town Council having been forwarded to Samuel Holme, Esq., the following is the reply received from him by your Secretary:—

"23, Royal Crescent, Bath, July 26, 1871.

"Sir,—I beg to acknowledge receipt of the Memorial of the Land and House Owners' Association, and to thank you for the same. I hope the Council will make such an alteration in their mode of leasing as will afford facilities to builders, and promote, as I believe it would do, the interest of the Corporate Estate.

I am, Sir, your most obedient Servant,

Mr. John Murphy, Secretary. SAMUEL HOLME."

The Finance Committee gave the memorial the most careful consideration, but resolved to recommend the Town Council not to make any alteration in the present mode of leasing, notwithstanding which your Council firmly believe that the day is not very distant when all Corporations and private individuals will be compelled to adopt the Perpetual Ground Rent System for building purposes, or to dispose of their Freeholds as is now the custom when lands are required for railways, town improvements, &c.

THE CLEANING OF HOUSES AFTER DISEASES.

Your Council received from members frequent complaints that they were required to clean houses whilst patients were so unwell as not to permit workmen to do the required cleanings, so that workmen had often to return after the loss of time in the preparations and in the journies, causing great expense to owners of property. Your Council memorialised the Town Council on the subject, and the Health Committee have directed that the cleaning notices for the future are not to be sent out until the patients are removed, or sufficiently recovered to allow the work to be forthwith proceeded with. And your Council would urge upon members the importance of losing no time in doing the required cleanings, so as to prevent fines, after the second notice shall have been received.

THE GREAT WASTE OF WATER.

Your Council again express their surprise that the Water Committee have not taken such steps as would effectually prevent the present enormous waste of water. As yet they do not appear to have reached the root of the evil. Very few of the pan closets, worked by the handles, prevent water running to waste. More or less water in most of these is running night and day.

Another very great waste of water is caused by the small iron cisterns, or rather, the balls and taps which work in them, very few of which are in such repair at any time, or can be kept so, as to shut the water off when the cisterns are full, causing the water to run off through the overflows. Your Council venture an opinion that the Water Engineer or Deputy should personally inspect, say 200 or 300 water closets indiscriminately, as samples of the whole in the town, and report to the Water Committee. Your Council

believe that the result would be a recommendation to do away with the present lever and pan system, to do away with all the small iron cisterns and that mode of supply, and to recommend that the water should be supplied by turning a tap simply for the water to run into the pans as long as required.

Your Council would also respectfully suggest that none but plumbers should be employed to inspect the water supplies, and that they should be required to make good all defects that would not cost more than say 1s. to 1s. 6d. if a plumber were employed in the ordinary way. The addition of a little oil to joints, a bit of leather to other places, or something done to the screws or taps would, if done when inspected, save hundreds of tons of water running to waste. All houses would then be under constant inspection.

Your Council further suggest that these little repairs should be done at the expense of the Water Committee. Large houses require as much or even more attention than small ones, as there are many taps in each large house to the one or two in a small house.

Drs. Parkes and Sanderson did not delegate their important work to subordinates; and the question of water supply is of that importance that it should not any longer be left to comparatively uneducated and unscientific persons to deal with. Such have made scores of reports, and with what result? The ratepayers are made to feel it in an increased water rate. Such a system would also be a great saving to owners of property. One owner reported to your Council that over 100 of the small iron cisterns were burst by the frost, about a year ago. Other owners reported the burstings of smaller numbers, which could not have taken place without an immense waste of water. The iron cisterns have proved a great failure from every point of view. This is the experience of those who have most to do with them.

Tenants found allowing water to run to waste, by neglecting to turn the water taps, under the proposed system, should be summoned before the magistrates.

It is questionable if the expense of the proposed inspections and repairs would amount to as much as the present inefficient

system of inspections; of entering each case in the books; of serving the several notices to do the repairs; and of issuing and serving summonses to appear before magistrates, all of which necessitate the employment of a greater number of persons than would, probably, be requisite under the proposed system of employing skilled artisans instead of unskilled labourers, with their attendant evils of routine and delay. Comparatively few repairs would be required after the change of system had been made.

SUMMARY.

During the year your Council have prepared Petitions and Memorials on the following subjects:—

1.—A Memorial was presented to the Town Council against increased Corporate expenditure, a copy of which is in the Appendix.

2.—A Memorial to the Town Council against numerous clauses in the Liverpool Improvement and Water Works Bill, 1871. (See Appendix.)

3.—A Memorial to the Town Council against Taxing the Ratepayers yearly to yield a rental for certain of the Committee-rooms used in the Municipal Offices. (See the Memorial on the Improvement Bill in Appendix.)

4.—A Petition was presented to Parliament against the Lodgers' Goods Protection Bill. (See Appendix.)

5.—A Petition was presented to Parliament against the Local Taxation Bill. (See Appendix.)

6.—A Petition was presented to Parliament against the Property Tax. (See Appendix.)

7.—A Public Meeting was called in the Law Association Rooms of owners of property, and non-members, to meet in Conference, on the question of Local Taxation; and, also, on the Lodgers' Goods Protection Bill. Petitions were presented to Parliament.

8.—A Petition was presented to the House of Lords against the Liverpool Improvement Bill and Water Works Bill, 1871, (See Appendix.) Signed by owners of property.

9.—A second Memorial was presented to the Town Council against the Liverpool Improvement and Water Works Bill, 1871.

10.—A Memorial to the Town Council, recommending Perpetual Ground Rents, instead of the present mode of leasing. (See Appendix.)

11.—A circular was sent to each member of the House of Lords, principally against compelling owners to pay for water whether the houses are occupied or not. (See Appendix.)

12.—A Petition to Parliament against Clauses in a Government Gas Bill was presented.

MEMBERS

OF THE

LAND & HOUSE OWNERS' ASSOCIATION.

The Members are respectfully requested to consult the following list, and to kindly urge upon those of their friends, whose names are not included in it, the necessity and advantage of their being connected with the Association.

The Subscription is Ten Shillings per Annum, payable in advance, on the 1st January.

Allen, Peter	36, Stitt-street.
Atherton, Joseph	26, North John-street.
Ashworth, Alfred	23, The Elms, Toxteth Park.
Atkinson, Jonathan	1, Edgar-street.
Archer, R. E.	Birkdale.
Alpass, H. S.	Park-road.
Ayrton, Francis	Norwood Grove, Wt. Derby-rd.
Adamson, R.	Old Haymarket.
Bath, James P.	Swift's-court, Castle-street.
Blease, J. S.	15, Lord-street.
Bailey and Neep	Melville-chambers, Lord-st.
Boggiano, Peter	12, Upper Duke-street.
Byrom, William	25, Great George-street.
Borris, W. C.	81, Mount Pleasant.
Brown, Theophilus	7, Clayton-square.
Blain, Joseph	78, Vine-street.
Bell, Joseph	Clarendon-rooms, S. John-st.
Byrne, G. M.	Harrington-street.
Beloe, H. C., Esq., J.P.	22, Lord-street.
Boult, F. H.	4, Cook-street.
Banner, W. G.	19, Slater-street.
Brown, Richard	22, Lord-street.

Braithwaite, J. B. .. .. ..12, Preeson's-row.
Brunt, E. .. ..Woodland villas, L. Bebington.
Barr, W. B. .. ..6, Moss-street.
Brumfitt, William .. .. ..22, Lord-street.
Bouch, Thomas, Esq., J.P. .. ..1, Old Hall-street.
Bond, W. A... .. .. ..Mersey Bank, Egremont.
Boult, Joseph .. .. ..Exchange-buildings.
Bell, Mrs. Alice .. .. ..7, Sussex-street, Birkenhead.
Bannister, B. .. .. ..Cottage-lane, Ormskirk.

Cheers, Francis .. .. ..34, South John-street.
Capel, F. . .. .41, Arnold-street.
Callow, Daniel .. .. ..12, Russell-street.
Caton, Thomas .. .. ..4, Clayton-square.
Cariss, Astrup .. .. ..40, Castle-street.
Chessworth and Elliott .. ..3, Lord-street.
Colton and Fryer .. .. ..Cook-street.
Caddick, David .. .. ..63, Langham-street.
Clegg, William .. .. ..63, Erskine-street.
Carr, George.. .. .. ..10, Canterbury-street.
Chadburn, C. H. .. .. ..71, Lord-street.
Callaghan, William .. .. ..16, Craven-street.
Cubbin, Richard .. .. ..57, Great Mersey-street.
Cobb, Thomas .. .. ..46, Everton Valley.
Cummins, J. J. .. .. ..35, Great Homer-street.
Corless, Henry .. .. ..54, Shakespear-street.
Cassidy, George .. .. ..41, Portland-place.
Cassidy, John .. .. ..43, Landseer-road.
Carter, John.. .. .. ..26, Redcross-street.

Denton, Isaac .. .. ..149, Park-road.
Daniels, William .. .. ..13, Bloom-street.
Davies, D. P. .. .. ..Canada Dock.
Dutch, Edward .. .. ..3, St. Domingo-road.
Duckworth, William .. ..24, Tarleton-street.

Eden, Catharine .. .. ..26, Hemans-street.
Evans, William .. .. ..93, Everton-terrace.
Edwards, Richard .. .. ..28, Torr-street, Everton.

Elias, Owen .. ..286, Scotland-road.
Eliss, William Owen .. ..286, Scotland-road.
Edwards, John .. .. ..16, Embledon-street.
Elias, William .. .. ..78, Netherfield-road.
Edwards, Robert .. .. ..48, Netherfield-road.
Elias, Edward .. .. ..78, Netherfield-road.
Edwards, Thomas .. .. ..11, Great Nelson-street.
Edwards, Richard .. .. ..18, Newington.
Evans, R. O... .. .. ..33, Everton-valley.

Furness, John .. .. ..123, Beaufort-street.
Fenton, William .. .. ..23, Islington.
Ford, Edward .. .. ..22, Lord-street.

Grierson, John .. .. ..34, Church-street.
Grierson, George .. .. ..34, Church-street.
Grice, John .. ..45, Whitechapel.
Golding, George .. .. ..24, North John-street.
Gibbons, John .. .. ..5, Beckwith-street.
Gardner, Richard .. .. ..Gardner's-road, Tue Brook.

Harrison, James .. .. ..1, Back Grafton-street.
Hughes, Thomas .. .. ..66, Penton-street.
Hebson, Joseph .. .. ..60, Roscommon-street.
Hughes, Simon .. .. ..98, Duke-street.
Horn and Kelly .. .. ..1, Norton-street.
Hargreaves, William .. ..13, Hackin's-hey.
Haworth, Henry .. .. ..14, Brownlow-hill.
Huntington, J. J. .. .. ..177, Mill-street.
Houghton, E. P. .. .. ..18, Seel-street.
Hodges, William .. .. ..28, Catharine-street.
Hallmark, Job .. .. ..18, Seel-street.
Harrington, Frederick .. ..90, Parliament-street.
Hedley, George .. .. ..58, Brunswick-road.
Hughes, Thomas .. .. ..10, Conyers-street.
Huntington, Joseph .. .. ..6, West Derby-road.
Holt, Thomas .. .. ..1, Oxford-street.
Hughes, Hugh .. .. ..88, Queen's-road.
Hudson, William .. .. ..Hapsford-road, Seaforth.

Hughes, Edwin .. .. ..41, Lord-street.
Harbord, F. G. .. .. ..South John-street.
Harbord, Richard .. .. ..South John-street.
Hardwick, Alfred .. .. ..178, Chatham-street.
Holland, Edgar .. .. ..Tower-buildings, Water-street.
Hughes, William .. .. ..Ty Newydd, Anglesea.
Haigh, Thomas .. .. ..49, Boundary-lane.
Hawthorne, William .. ..13, Grinfield-street.
Hughes, David .. .. ..William Moult-street.
Hauck, J. P. .. .. ..39, Huskisson-street.
Hughes and Reay .. .. ..4, Clayton-square.
Hignett, T. W. .. .. ..33, Lord-street.
Holt, Mrs. .. ..32, Castle-street.

Ivimey, James .. ..16, Portland-place.

Jones, Thomas .. .. ..87, Everton Village.
Jones, Owen.. .. .. ..59, York-terrace.
Jones, John Lloyd .. .. ..6, Lord-street.
Jones, Edward .. .. ..1, Hockenhall Alley.
Jones, Henry .. .. ..Oxford-chambers, Lord-street.
Jones, J. H. .. ..55, Crete-street.
Jones, John .. ..2, Mitylene-street.
Jones, John .. ..4, Thackeray-street.
Jones, Ellis .. ..3, Landseer-road.
Jones and Savage .. .. ..75, Langsdale-street.
Joynson, William .. .. ..5, Clayton-square.
Jones, John .. ..1, Stafford-street.
Jones, John .. ..45, Cranmer-street.
Jones, John .. ..7, Vernon-place, Birkenhead.
Jones, Griffith .. .. ..67, Bourne-street.
Jones, Richard .. .. ..27, Fitzclarence-street.

Kershaw, William .. .. ..17, South John street.
Kennedy, James .. .. ..Cressington Park, Aigburth.

Lewis Brothers .. .. ..10, Louis street.
Lyon, Richard .. .. ..57, North John street.
Lewis and Mounsey.. . ..3, Lord street.

Leyland, Henry .. .. ..61, Berkley street.
Leyland, William .. .. ..Greenhey's road, Toxteth Park
Lewis, Hugh .. .. ..60, Crete street.
Lunt, W. J. .. ..77, Prescot street.
Lewis, Richard .. .. ..88, Phythian street.
Leyland, Ralph .. .. ..Grassendale Park, Aigburth.

McDougal, Malcolm.. .. ..Springfield cottage, Walton.
Mason, George .. .. ..32, Castle street.
Martin, Timpron .. .. ..48, Castle street.
McConnell, George .. .. ..5, Church alley.
McAdam, F. J. .. .. ..Clarendon rooms.
Molyneux, William .. .. ..62, Great Howard street.
McCaig, William .. .. ..1, Swiss road, Fairfield.
Mellor, James . .. ..14, Hunter street.
Murphy, John .. .. ..Clarendon rooms.
Moldenhauer, M. R . .. ..119, Beaufort street.
Mason, W. J. .. .. ..32, Castle street.
Moore, Henry .. . ..28, Great George place.

Newall and Harrop .. .. ..3, Clayton square
Nelson, Peter .. .. ..51, St. Domingo road.
North, W. H. .. .. ..48, Grove street.

Owen, Edward .. .. ..77, Mitylene street.
Overend, William .. .. ..37, Cheapside.
Owen, Joseph .. .. ..67, St. Anne street.
Owen, George .. .. ..Hatton Garden.
Owen, Thomas .. .. ..67, Old Hall street.
Owen, Maurice .. .. ..38, Newstead road.
Owens, Richard ... .2, Breck road.

Priest, T. E... .. .. ..Clarendon rooms.
Picton, J. A., Esq., J. P. .. ..11, Dale street.
Price, John. .. ..64, Whitechapel.
Parry, William .. .. ..36, Beaumont street.
Parry, Joseph .. .. ..68, Roscommon street.
Parry, John .. ..35, Netherfield road.
Pierce, Walter .. .. ..Castle chambers, 26, Castle st

Quilliam, Samuel .. .. . 28, Elizabeth street.

Roberts, Richard .. .. ..80, Prince Edwin street.
Roberts, David and Co. .. ..Fox street.
Robinson, Jane .. .. ..39, Great Homer street.
Roberts, Robert .. .. .289, Netherfield road.
Roberts, E. W. .. .. ..61, Islington.
Robinson, John .. .. ..41, Lord street.
Rowe, James .. .. ..14, South Castle street.
Rook, Henry.. .. .. ..177, Islington.
Robinson, W. W. .. .. ..20, Mathew street.
Roberts, Edward . .. ..Commerce court, Lord-street.
Roberts, Robert . .. ..51, Conyers street.
Roberts and Owens .. ..21, Taylor street.
Rankin, R. & J. .. .. ..Manchester street.
Radcliffe, Reginald .. .. ..St. George's crescent.
Roberts, R. & R. .. .. ..2, Priory street.
Riley, G. W... .. .. ..63, Upper Beau street.
Roberts, Evan .. .. ..81, Burleigh road South
Roberts, Owen .. .. ..14, Netherfield road.
Rook, John .. .. ..24, Grove street.
Roberts, Robert .. .. ..13, Holly Bank road, B'head.
Roberts, Thomas .. .. ..34, Upper Hope place.
Roberts, Owen .. ..36, Everton Valley.

Strains, William .. .. ..206, Mill street.
Stananought, R. C. .. .. ..87, Lord street.
Sutcliffe, A. R. .. .. ..32, Castle street.
Sweeting, C.... .. .. ..16, Lord street.
Shimmin, Hugh .. .. ..6, Lord street.
Smith, James .. .. ..146, Bedford street.
Spelman, William .. ..Clarendon rooms.

Taylor, William .. .. ..3, Lydia Ann street.
Thomas, Robert .. ..62, Oxford street.
Thompson, James .. ..34, South John street.
Trumble, George .. .. ..12, Cases street.
Taylor, Edward . .. ..Chapel walks.
Thompson, J. G. . .. ..62, Tweed street.

Tod, James .. ..Well-lane, Tranmere.
Toward, James .. .. ..25, Pembroke place.
Turner, George .. .. ..44, Church street.
Thompson, James .. . ..46, Rodney street.
Thomas, Joseph .. .. ..200, Scotland road.

Underhill, James .. .. ..46, Church street.

Williams, Hugh .. ..2, Stanfield road, Everton.
Wells, Charles .. .. ..8, Wellington fields, Smithdown rd.
White, John.. .. ..12, Cases street.
Woodburn, Thomas .. .. ..Law Association rooms.
Williams, Owen .. .. ..32, Castle street.
Williams, Richard .. .. ..87, Lord street.
Wade and Co. ... .Tyrone buildings, Victoria st.
Williams, Thomas .. .. ..28, Gelling street.
Williams, O. and D.... .. ..21, Taylor street.
Williams, Charles .. .. ..8, Crown street.
Winder, Thomas .. .. ..3, Pownall street.
Wensley and Parle .. .. ..4, Clayton square.
Williams, John .. .. ..3, Cable street.
Wynne, Thomas .. .. ..146, Dale street.
Williams, R... .. .. ..Carruthers street.
White, Alexander .. .. ..119, Duke street.
Whitby, John .. ..Lingdale Villa, Oxton.

Yates, Joseph B. (Trustee of) ...T. Caton, 4, Clayton square.

THE TREASURER IN ACCOUNT WITH THE LIVERPOOL LAND AND HOUSE OWNERS' ASSOCIATION.

Dr. *For the Year ending 30th November, 1871.* Cr.

	£	s.	d.
To Amount of Subscriptions	106	18	0
„ **DONATIONS, viz.:**			
Liverpool Land Company £5 0 0			
Messrs. Macfie and Son 5 0 0			
Thomas Bouch, Esq. 5 0 0			
James Mellor, Esq. 5 0 0			
Messrs. Marquis Briscoe & Co. 1 0 0			
	21	0	0
	£127	18	0

	£	s.	d
By Balance as per Report	2	1	1
„ Printing Reports, Circulars, &c.	16	0	0
„ Law Stationers, Engrossing, Petitions, &c.	6	11	0
„ Stationery, Advertising, Postages, &c.	10	19	9
„ Rent of Meeting Rooms	5	6	6
„ Expenses on Improvement Bill	10	0	0
„ Paid Mr. Walter Pierce for Professional Services	25	0	0
„ Secretary's Salary and Commission	47	11	4
„ Balance carried down	4	8	4
	£127	18	0
To Balance Brought down	£4	8	4

Examined and found correct.

JAS. UNDERHILL, } AUDITORS.
JOHN GRIERSON, }

LIVERPOOL, *9th December*, 1871.

NOTE.—OWEN ELIAS, Esq., paid to the Solicitor direct—not through the Treasurer—£10 10s. as a Donation towards the expense of opposing the Improvement Bill in the House of Lords.

APPENDIX.

CORPORATE EXPENDITURE.

TO THE MAYOR, ALDERMEN, AND BURGESSES OF THE BOROUGH OF LIVERPOOL, IN COUNCIL ASSEMBLED.

The respectful Memorial of the Liverpool Land and House Owners' Association.

SHEWETH,—That your memorialists have had reason to express their satisfaction for the great efforts made during the last two years in the direction of retrenchment, and they hope further efforts will yet be made.

Your memorialists beg to draw the attention of the Council to the fact that there has been a reduction in the staff of several of the departments, and the public will expect that the result of such reduction will be to reduce the amount of taxation.

Your memorialists find that the general rate is to be increased in all the wards—in some as much as 2d. in the pound—and they cannot but express their surprise that any such increase should be contemplated, as, upon reference to that rate, it will be found to be chargeable with the following items of expenditure, viz:—Salaries of local surveyor and staff; road surveyors; treasurer, clerks, and collectors; medical officer of health staff; inspector of nuisances staff; superintendent of scavengers; cleansing of ashpits and middens, and others.

All these are the main departments that it has so frequently been asserted a considerable decrease in expenditure was effected. It will, therefore, cause some astonishment and disappointment to the public to find that, notwithstanding the decrease in expenditure, the taxation is intended to be increased—an anomaly that will be difficult to comprehend.

Your memorialists therefore pray that no increase be made in the general rate. And your memorialists will ever pray, &c.

January 31, 1871. WALTER PIERCE, President.

PROPERTY TAX.

TO THE HONOURABLE THE COMMONS OF THE UNITED KINGDOM OF GREAT BRITAIN AND IRELAND IN PARLIAMENT ASSEMBLED.

The humble Petition of the Liverpool Land and House Owners' Association,

SHEWETH,—That your petitioners are an association of owners of property in the Borough of Liverpool and the neighbourhood thereof, established for the promotion of the interests of the owners of warehouse, manufacturing house, land, and other property.

That your petitioners humbly submit that the payments of each class who have to contribute towards the property tax should be in exact proportion to the income of each, whilst the present mode of collecting the property tax is quite opposed to this self-evident and just principle.

That your petitioners humbly submit that the property tax to be paid by owners of property should be on the nett sum received by them, after making all deductions. In the case of the mortgagee, the property tax paid by him is on the nett amount of interest which he receives. In like manner those who invest in consols, or railways, or insurance companies, or who lend money to corporations, or local boards, or dock boards, the tax paid by them is on the nett amount of interest or dividend they receive, that is to say, on the clear income arising therefrom. Whereas, in respect of the owners of land and other property, the tax is paid on the rentals, which greatly exceed the nett income owners receive from their property after all deductions for repairs, insurance, and other legitimate annual expenses have been made. And your petitioners humbly submit the following as illustrative of the complaint sought to be established:—In the first case, the property tax paid was equal to 1s. 1¾d. in the pound upon the nett income received by the owner from his property: in a second case 1s. 7¼d. in the pound; in a third case, 6s. 9¼d. in the pound; in a fourth case, 2s. 0¾d. in the pound; in a fifth instance, 1s. 6¾d. in the pound; in a sixth case, 1s 0¾d. was paid; in a seventh instance there was a loss of £8 6s. 1d. on the year by the payments being in excess of the income derived from the property; still, notwithstanding, a sum of £1 1s. 3d. was paid as property tax. These instances have been taken indiscriminately, and upon diligent inquiry your petitioners believe that thousands of similar cases would be found where such enormous and excessive proportions of property tax are paid by property owners. This very unjust burden thrown upon them will more clearly appear, when it is remembered that the property tax payable on other classes of property was 4d. in the pound only.

Your petitioners therefore humbly pray, that your honourable house will take into consideration the case of your petitioners as herein set forth, and that for the future the property tax chargeable against owners of property may be upon the nett annual income derived from their property, after all reasonable allowances and deductions have been made for the expenses and other attendant charges on such property.

Your petitioners therefore pray, that owners of property be required to pay property tax only upon the nett sums they may receive; the same as all other classes who have to contribute to it.

And your petitioners, &c.

WALTER PIERCE, President.

LIVERPOOL IMPROVEMENT AND WATER WORKS, 1871.

To the Right Honourable the Lords Spiritual and Temporal, in Parliament assembled,

The humble Petition of the undersigned Land and House Owners of the Borough of Liverpool.

SHEWETH,—That your Petitioners are very extensive owners of land and buildings within the Parliamentary Borough of Liverpool.

That a Bill is now depending before your Right Honourable House intituled, "An Act to enable the Mayor, Aldermen, and Burgesses of the Borough of Liverpool to make new and widen existing streets, and to construct new works in connection with their waterworks, to make further provision with respect to streets and buildings, and for the further improvement and government of the said Borough, and for other purposes."

That it is proposed by section 37 of the said Bill to prohibit the erection of buildings in narrow streets over and above the height of 30

feet, except in the case of buildings already existing, and in streets laid out before the passing of the Bill. But this exception is nullified in the event of the Corporation considering that a building beyond 30 feet in height will be prejudicial to health, in which case such building will not be permitted, but the party aggrieved may apply to two Justices, or to the Board of Trade to appoint a Surveyor to enquire into the matter at the cost of the owner.

Your petitioners humbly submit that the restrictions proposed by the said Bill will seriously affect the interests of the owners of property and the whole community of Liverpool. In a large commercial and seaport town, the progress of its commerce necessarily requires the building of warehouses, banks, insurance offices, and other Public Buildings, and the tendency of such buildings is no doubt to drive from the localities and districts where commerce is most prominent, buildings and premises suitable only for dwellings. It is for the advantage of the working man that his dwelling should be away from the immediate neighbourhood of his work, and any measure tending to restrict the building of commercial premises will seriously injure the value of property and the welfare of the town. Your Petitioners also submit that the sanitary condition of Liverpool is not affected by the building of warehouses, banks, and other public buildings, but that the class of buildings really injurious to health are the low dwellings of the poor that were built many years past, and in districts that are now the seat of the commerce of the town; but that if the property of your Petitioners is to be sacrificed for the health of the town, your Petitioners should be compensated for such loss. Your Petitioners can point to the neighbourhood of the Town Hall of Liverpool, and within a radius of half-a-mile therefrom, nearly the entire land is occupied by commercial buildings, and though the streets are narrow, the circulation of air is not impeded by reason of the buildings being seventy or eighty feet high.

That several of the proposed enactments of the Bill are unprecedented, and will occasion serious loss to your Petitioners as owners of property in the Borough.

The 40th section of the Bill will prevent owners of property building except under the approval of the Corporation, and without appeal; and the same section gives the Corporation compulsory powers over property, for the purpose of widening or extending any streets, without securing compensation for the land taken or the loss sustained by the owner by reason of the exercise of such powers.

The 118th section of the Bill is an interference with your Petitioners' rights of property which is unjust. This section gives the Corporation the right to allow the tenant to apply the property of the owner to purposes which the owner would not wish or require.

That the 31st section, which enables the Corporation to enforce the fencing of unbuilt lands, should not be exercised, except it can be shown that such fencing was necessary either for public health or safety.

Many other clauses in the Bill are an infringement of your Petitioners' rights and privileges as owners of property, and not warranted by any circumstances as affecting the sanitary condition of the Borough.

That your Petitioners are fully alive to all the requirements necessary for the public health, and they submit that the provisions of the Bill only tend to reduce the value of property and check the advance and progress of commerce, and are not warranted by any public necessity.

Your Petitioners object to the powers and provisions of the Bill so complained of, and they humbly submit that the preamble of the Bill, so far as relates thereto, is incapable of proof.

Your Petitioners, therefore, humbly pray that the said Bill may not pass into law as it now stands, and that they may be heard by counsel,

agents, and witnesses, before any Committee of your Right Honourable House to whom the same may be referred, against the preamble and clauses thereof in so far as their property, rights, and interests may be thereby affected, and, if need be, in support of the insertion in the said Bill of such amendments, clauses, and provisions as may be necessary for your Petitioners' protection, or that such other relief may be afforded to your Petitioners in the premises as to your Right Honourable House may seem meet.

And your Petitioners will ever pray, &c.

WALTER PIERCE, President.

PERPETUAL GROUND RENTS FOR CORPORATION PROPERTY.

The respectful Memorial of the Liverpool Land and House Owners' Association,

Sheweth,—That your memorialists have learned with regret that the Town Council of Liverpool have determined that the lands in Sefton Park, Newsham Park, and Stanley Park are to be leased for 75 years instead of upon a perpetual ground rent.

Your memorialists believe that the present system of leasing lands for comparatively short periods of years, by private individuals or corporations, is founded on injustice; and the sooner the system is discontinued by the Town Council of Liverpool, the sooner may it reasonably be expected that the rich land-owners of the neighbourhood will be compelled to deal with their lands on a more equitable principle, for it cannot be right for land-owners or corporations to become possessed of all property placed upon leasehold land, whether houses, shops, warehouses, counting houses, works, or manufactories, without ever paying one farthing for all the materials, or for the labour expended thereon, causing one section of the community to become enormously rich and powerful, and thus keeping the great "working bee" comparatively poor.

Your memorialists believe that the principle of allowing owners of the soil always to retain possession of it, and of allowing tenants to have the benefit of any improvements, whether in building or otherwise, will be effected by adopting the system of perpetual ground rents.

In support of the principle of perpetual ground rents, your memorialists quote from a letter published by Samuel Holme, Esq., dated from Bath, in which he has written—"In my opinion, the most prudent and politic of all emendations will be to alter the present system of leasing the property of the Corporation, and to substitute the payment of an annual ground rent in perpetuity for the present term of 75 years. Our acute neighbours in Manchester understand the advantages of this mode better than we do. I know that Mr. Stewart has long been of this opinion, and very cordially did I second him when he attempted to introduce such a desirable change." Again he has written—"taking a freehold property to pay 5½ per cent. gross, or 5 per cent. nett, the value is 18 years' purchase. Applying the same to Corporation leasehold, allowing for the lapse of the lease and cost of renewal, the same may be estimated at 16 years' purchase, making a difference of two years' purchase in their respective value. At present, therefore, in purchasing freehold land at 18s. per yard, 1000 yards will cost £9,000. If an adjoining lot is worth 16s. a yard leasehold, it will cost £8,000. If I erect an edifice upon each, at a cost of £2,000, the difference of value in land and building is only £100, and nine out of ten prefer possessing the freehold for £2,900 rather than the

leasehold for £2,800." Your memorialists respectfully submit that these two gentlemen must be taken as great authorities upon this question.

But your memorialists believe there are still higher grounds why the present system of leasing should be got rid of. In towns and cities where the system of perpetual ground rents is much in use, similar large and small houses are to be had at much lower rentals than in Liverpool. If a builder embarks in a building operation he will expect profit on his gross outlay, whether for the land or the building. But if he has to find capital for the erection only, he will look for his profit upon that simply. It should be an object of local boards and town councils so to legislate as that good dwellings may be obtained at the least possible rentals, and the system of perpetual ground rents would greatly assist to obtain that end.

Your memorialists find from a parliamentary return that in Birmingham 63 per cent. of the houses were rented at £8 and under, in Manchester 49 per cent., in Leeds 63 per cent.; whilst in Liverpool and the Tower Hamlets at that time the number was only 26 per cent. And the rents of the cottages of the working classes in Birmingham, Leeds, and Manchester are fully £4 per annum lower than those in Liverpool, much of the difference being attributable to the system of ground rents which largely prevails in those towns for the following reasons: If a builder purchase land to build a cottage, house, or mansion he would naturally expect a return of say, 8 per cent. upon his outlay, whilst an original landowner would, likely, be satisfied with a 4 or 4½ per cent. interest, and that too, upon a very much less price per yard to begin with, which state of things would naturally affect the rent question. Also a builder, upon obtaining a mortgage, would not sink away any of his capital in the land as he does at present upon obtaining a loan of two-thirds of the value of the property; this, again, affects the rent question, enabling sharper competition.

The system of perpetual ground rents would tend greatly to keep separate the capital from the income of the Corporation, so that all the income at the end of each year would be at disposal for the benefit of the ratepayers. And were this system of perpetual ground rents carried out on a large scale for large and small property, the inhabitants would be supplied with much better houses at very much reduced rents, so that other large and small landed proprietors would be compelled to fall in with the same system or hold their lands for agricultural purposes.

Your memorialists believe that the present system of leasings for 75 years has its root in a desire to create an estate for the ratepayers, that their taxation may be reduced thereby annually. Better leave the estate in the pockets of the people by enabling them to reside in lower-rented houses that they may have money to spare for extra taxation when really necessary, and thus prevent an enormous and extravagant expenditure such as that now in existence in the management of the Corporate Estate.

Your memorialists, therefore, respectfully ask that the system of perpetual ground rents be adopted instead of that now used by the Town Council.—(Signed)

WALTER PIERCE, President.

LIVERPOOL IMPROVEMENT AND WATER WORKS BILL.

A Copy of the following letter was sent to each Member of the House of Lords.

MY LORD,—As President of the Liverpool Land and House Owners' Association, I beg most respectfully to direct your attention to the words in italics at the end of the 1st subsection of the following clause taken from the Liverpool Improvement and Waterworks Bill, which has just passed through a committee of your Lordship's House.

46. And with respect to the composition for water rates payable under the recited Waterworks Acts, the following provisions shall apply (that is to say):—

1. Where the net yearly rateable value of any premises within the limits of the supply of Water by the Corporation does not exceed thirteen pounds the owner shall from time to time, by way of composition for payment of the several rates under the recited Waterworks Acts, be rated upon a reduced estimate of three-fourths of the net yearly rateable value of the premises, *whether the same be occupied or not.*

On the day when the last census was taken in Everton and Kirkdale Ward alone there were upwards of 1,700 houses empty, and in the Parish of Liverpool 4,266, many of which are empty the year round, and owners of property would feel it a very great hardship at being obliged to pay Water Rent when the property is unoccupied, and the landlord receives no rent.

Gas mains are laid in front of empty houses side by side with water mains, and it would be quite as just to compel payment for gas not consumed as to pay for water not obtained.

The Clause *objected to is* as your lordship is aware *opposed* to the law of the country, that only property yielding rent should pay taxes; and I venture to hope that your attention being thus brought to the consideration of the question, will be the means of altering the Clause, so that occupied property alone shall pay the Water Rate.

The marginal note of the Bill is incorrect.* 50 per cent. is allowed to the owner for paying his tenants' Borough Rates, 50 per cent. for paying his Poor Rate, whereas only 25 per cent. is proposed to be allowed by the said Clause.

I trust your lordship will support the views of the House Owners' Association, and obtain an Amendment of the clause compelling the owner to pay a water rate, with the composition proposed, on occupied premises only.

I am, my Lord, your Lordship's obedient humble Servant,

WALTER PIERCE.

* Assimilating provisions as to composition for water rates to provisions as to composition for other rates.

LODGERS' GOODS PROTECTION BILL.

To the Honourable the Commons of the United Kingdom of Great Britain and Ireland, in Parliament Assembled.

THE HUMBLE PETITION OF THE LIVERPOOL LAND AND HOUSE OWNERS' ASSOCIATION

SHEWETH, that your Petitioners are an Association of Owners of Property in the Borough of Liverpool and the neighbourhood thereof, established for the promotion of the interests of the Owners of Warehouse, Manufacturing, House, Land, and other property.

That your Petitioners are greatly alarmed by the provisions of "A Bill to Protect the Goods of Lodgers" against distraint by landlords, which, if carried into law, would bring into existence evils immeasurably greater than those which result from the present state of the law.

Your Petitioners humbly submit that on the very face of the Bill it is conceived in injustice, for it provides there shall be one law for the rich and another for the poor, as it exempts wealthy owners of property in agricultural districts from its operation. If the goods of a lodger should be free from distraint in a house in a town or city, justice demands that they should be equally free in a farm house, or in tenements in agricultural districts. The clause in the Bill is as follows: "This Act shall not apply to tenancies of land or the tenements thereon, or to farms or tenancies for agricultural purposes;" in these cases the power to distrain would continue as at present and the rights of the agricultural landlords be reserved, while those of the house owners in towns be annihilated.

Your Petitioners would respectfully direct attention to the fact that the Health Committee of Liverpool have instituted a partial investigation of the numbers of what are termed "sub-let" houses, occupied by families in single apartments. They have registered, under official surveillance, 8,600 of such houses. It is assumed by Dr. Trench, the Medical Officer of Health for the Borough, that there remain 17,000 more which would rightly come under the designation of "sub-let," thus showing that a third of the population is living in such houses. And the same authorities point out how these houses are occupied. Houses, they say, which landlords let to tenants for 3s. 6d. per week are "sub-let" again to lodgers—the middle room at 2s. per week, and the upper room for 1s. 3d. per week, so that the chief tenants, who occupy the bottom rooms, sit at a rental of only 3d. per week. Then the case of a house which lets at 4s. 6d. per week is dealt with showing that the upper room and cellar together let at 1s. 6d. per week, the middle room for 2s., so that the chief tenant sits at a rental of 1s. per week.

Your Petitioners humbly submit that to take from the landlord the power to distrain over such a large and low class of tenants would, in effect, be to seriously injure a very large proportion of the whole property of the kingdom, to say nothing of the demoralisation, fraud, perjury, and litigation which would flow from the change. In a general way all goods found upon the premises when warrants were about to be put in force would be shewn to belong to lodgers, for as the bill is at present framed, any person might hand a declaration to the landlord, shewing that all the goods belonged to such person, and then he might go to America or elsewhere, with a certainty that no proceedings could be taken against him, and the landlord would lose his rent, while the tenant would keep possession of the house until the owner had gone through the tedious process of legal ejectment.

Your Petitioners would respectfully submit, that all sub-tenants, by taking a little trouble, may protect their goods as the law at present stands, which many sub-tenants are in the habit of doing, by calling upon the superior landlord to ascertain if there be any arrears of rent before entering upon the apartments, and obtaining from him an undertaking that no distress would be made upon his goods, on condition of the sub-tenant's paying his rent direct to the superior landlord on account of the rent payable by the immediate tenant; and if the attainment of justice be the object of the provisions of this bill it must be right that all those who are day and night provided with shelter should pay for it to those who supply it to them. If any bill should pass into law this feature should be amply provided for.

Your Petitioners humbly submit that this Bill virtually does away with the power of distress, as it would be useless for owners to issue warrants under the provisions of such a bill, for thousands of main tenants sit, some free of rent, others at 3d., 6d., 9d., and 1s. per week, and the goods in their apartments correspond very much with the rentals paid by them; to issue warrants under such circumstances would be folly. Rents at present are most difficult to collect from such property, and thousands pay only from the fear of distraint, though comparatively not many warrants are executed. If the intention be to apply the same law in the collection of rates and taxes the loss would be very great.

Your Petitioners humbly submit that, in the larger class of property, a change in the law is quite unnecessary, as the intelligent sub-tenant can always secure his goods from distraint by communicating with the superior landlord or his agent, who are always ready to accommodate sub-tenants by arrangement and consent of the immediate tenant. In conclusion, your Petitioners respectfully submit that, if the power to distrain is objectionable, the whole question of distraint should be taken up and considered openly, fairly, and broadly, in a direct manner, instead of the insidious way it is dealt with in this Bill. For England the law of distraint is quite as important and necessary as the law of hypothec is for Scotland.

Your Petitioners, therefore, humbly pray, that class legislation be not, as in this Bill, revived; that the provisions of the bill be not passed into law; and that, if legislation be deemed desirable, that Sub-tenants be required to pay their rents direct to their superior landlords if their goods are to be free from distraint.

And your Petitioners will ever pray.

WALTER PIERCE, PRESIDENT.

with Mr J. A. Bostock's compliments

METROPOLITAN ASYLUM DISTRICT.

FIRST ANNUAL REPORT

OF THE

COMMITTEE OF MANAGEMENT

OF THE

STOCKWELL

FEVER AND SMALLPOX HOSPITALS,

1871—2.

Committee of Management:

J. A. SHAW STEWART, Esq., J.P., *Chairman.*

DR. BREWER, M.P., J.P., *Chairman of the Board.*	ALFRED SUTER, Esq., *Vice-Chairman of the Board.*
JAMES BARNES, Esq.	COLONEL FRANCIS HAYGARTH.
SIR MICHAEL HICKS BEACH, Bart., M.P.	GEORGE LOCKYER, Esq.
JNO. A. BOSTOCK, Esq., C.B.	MICHAEL SAISON, Esq.
REV. FRANCIS CAMERON, M.A.	HUGH H. SEYMOUR, Esq., J.P.
JOHN DOULTON, Esq.	JOHN T. WILKINS, Esq.

Clerk to the Managers—WM. FRANCIS JEBB, Esq.

LONDON:
HARRISON AND SONS, ST. MARTIN'S LANE,
Printers in Ordinary to Her Majesty.

1872.

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1866.

OFFICERS OF THE SMALLPOX HOSPITAL.

Medical Superintendent ..	Dr. C. McCann.
Assistant Superintendent ..	Dr. P. H. McKellar.
Chaplain	Rev. D. Elsdale.
House Superintendent ..	Mr. Wm. Frost.
Matron	Mrs. Bicknell.

OFFICERS OF THE FEVER HOSPITAL.

Medical Superintendent ..	
Chaplain	Rev. C. Bicknell.
House Superintendent ..	
Matron	Mrs. Godwin.

Clerk to the Committee ..	Mr. J. H. Rutherglen.

WALLER, PRINTER, LONDON.

METROPOLITAN ASYLUM DISTRICT.

FIRST ANNUAL REPORT OF THE COMMITTEE

FOR

STOCKWELL FEVER AND SMALLPOX HOSPITALS,

FOR THE YEAR ENDING 1st FEBRUARY, 1872.

Twelve months having elapsed on the 1st of February last since the opening of these Hospitals, your Committee requested Dr. McCann, the Medical Superintendent of the Smallpox Hospital, to prepare and submit to them a report of the medical work of that Hospital, and they have thought that it would not be uninteresting to the Managers to have this laid before them, together with a brief summary of the Committee's proceedings for the year.

On the 31st January, 1871, the Smallpox Hospital was opened with its original number of 102 beds; but so rapidly were Patients sent in, that on the 3rd February it was found necessary to raise the accommodation to 130 by placing beds in the day rooms; and, having regard to the pressure for space, the Committee increased the number of beds in the Fever Hospital from 176 to 224, and, at the request of the

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Managers, opened that Hospital on the 6th March for the reception of Smallpox cases.

In a few days the latter Hospital rapidly filled, and on the 24th of March it was found necessary to further increase the accommodation by placing 30 additional beds in the day rooms.

Although, during the month of April, some relief was afforded by the transmission of Convalescent Patients to the Islington Convalescent Hospital of the Managers, and to a Convalescent Home at Clapton, the rapidity with which the disease spread during this month in the Southern District, created such a demand upon the Hospitals, that the Committee determined, with the approval of the Managers, not only to raise the number of beds within the two Hospitals from 384 to 500, by placing beds for Convalescents in the corridors and landings, but also to pitch an encampment for 120 Convalescent Patients on the vacant plots of ground in front of the Fever Hospital.

With the valuable co-operation of General Sir Henry Storks, M.P., G.C.B., and Col. Stephenson, C.B., commanding the Scots Fusilier Guards, your Committee were enabled within three days to obtain and get ready for occupation ten hospital marquees, capable of accommodating 120 Patients. The total cost of these tents, including flooring, passages, &c., was about £400, or less than £3 10*s.* a bed.

The wisdom of the steps taken by your Committee was fully verified in the ensuing month of May, when the disease appeared to attain its maximum, upwards of 600 Patients being under treatment at one time in the Hospitals, with a weekly admission of nearly 150 fresh cases, and a total of nearly 2,000 Patients having passed through the Hospitals up to the end of May.

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From this date the disease began to abate, and with the additional relief afforded after the second week in May by the use of the Hospital Ship "Dreadnought," the number of Patients was so far lessened as to enable your Committee, towards the end of July, to reduce the beds from 620 to 450, with a corresponding reduction in the staff; and by the end of September the Fever Hospital was emptied of Patients, and its cleansing and disinfection for the reception of fever Patients proceeded with.

Scarcely, however, had this been completed, and the Hospital prepared for its original purpose, than a fresh outbreak of Smallpox towards the end of December, in the Southern District, rendered it necessary again to have recourse to the employment of a portion of the Hospital for the treatment of Smallpox cases, in order to avoid the necessity of sending acute cases on so long a journey as to Hampstead Hospital.

The annexed Report of Dr. McCann will give many valuable statistics; and your Committee regret that owing to the resignation and absence from England of Dr. Barbour, the same information cannot be given for the Fever Hospital; but appended is a list of the number of Patients sent into the two Hospitals from each of the Parishes and Unions between the 31st January, 1871, and the 1st February, 1872, from which it will be seen that during that period a total of 3,976 Patients have passed through the Hospitals, of whom 700 or 17·6 per cent. have died; and, as showing the extent to which the Convalescent accommodation provided by the Managers was turned to account from the Stockwell Hospitals, it may be mentioned that upwards of 900 Convalescents were transferred therefrom.

The daily cost per head for the maintenance and clothing

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of Patients during the half-year ending Lady-day, 1871, was 2*s.* 2½*d.*, and for the maintenance and salaries of officers, &c., during the same period, 2*s.* 1*d.*, but for the half-year ending Michaelmas, these charges had been reduced respectively to 1*s.* 2½*d.* and 10*d.* per head. The cause of this great discrepancy has already been fully explained by your Committee, and it will therefore be sufficient to point out that in the first half-year, the expenditure was only spread over a few weeks, and that heavy items for Fuel, Gas, and Water, required to clean and dry the new Hospitals, were exceptionally included in that half-year, which could not subsequently occur.

The first, and perhaps most serious, trouble, with which your Committee have had to contend, was the difficulty experienced at the outset in getting suitable Nurses. Doubtless, the loathsome nature of the disease, as well as its contagious character, had the effect of deterring the better class of Nurses from entering on the work, but as it became known that, owing to the protection afforded by carrying out a careful system of re-vaccination, the Staff of the Hospitals enjoyed almost a complete immunity from the disease, very suitable women presented themselves, and your Committee have been enabled, from time to time, so to weed out the indifferent Nurses with whom they at first had to be contented, that they believe they at present possess a Staff which will favorably bear comparison with that of any Hospital in the country.

The other difficulties with which your Committee have had to contend have chiefly arisen out of the changing of the principal Officers of the Fever Hospital, none of those with whom the Hospital commenced being now there; the first Matron resigned at a most inopportune moment, viz., three days before the Hospital opened; Dr. Barbour, the Medical

WALTER FINDON, PRINTER.

Superintendent, having upon the closing of the Hospital in September, applied for six months' leave of absence, which your Committee could not feel justified in according, at once tendered his resignation; and Mr. Crook, the House Superintendent, resigned and left at Christmas last; these appointments have however been since filled up by officers whom the Committee feel sure will thoroughly second their efforts for the welfare of the Hospital.

These changes have necessarily caused your Committee much trouble and anxiety, so far as regards the Fever Hospital, and it is therefore the more gratifying for them to be able to take this opportunity of recording their entire satisfaction with the manner in which Dr. McCann, the Medical Superintendent, and his assistants, Drs. White and McKellar; the Revs. D. Elsdale and C. Bicknell, the Chaplains; Mr. Frost, the House Superintendent, and Mrs. Bicknell, the Matron, as well as all the subordinate Staff of the Smallpox Hospital, have devoted themselves to the discharge of an arduous and frequently most disagreeable duty; the tax upon their time and energies during the last twelve months has been continuous and severe, but they have done their work cheerfully and well, and merit the best thanks of your Committee and of the Managers.

The Assessment Committee of Lambeth, having assessed the Hospitals at a rateable value of £1,709 for the Fever Hospital, and of £1,334 for the Smallpox Hospital, your Committee, considering these ratings to be excessive, took steps for appealing against them; and, after considerable negotiation, the Assessment Committee, in order to avoid further litigation, consented to adopt the figures fixed by your Committee, viz., £1,297 for the Fever, and £1,012 for the Smallpox Hospital,

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or a total reduction of £734 on the rating of the two hospitals, which represents an annual saving of from £180 to £200. The Committee have also claimed and obtained exemption for the Hospitals from Property Tax and Inhabited House Duty.

Your Committee have now dealt with the most important matters which have occupied their attention during the first year of the working of these Hospitals; they have, moreover, from time to time, effected such alterations and additions to the buildings as they have found necessary, and have also laid down such regulations as they have considered would conduce to the satisfactory working of the Hospitals, and it may be well to mention that, in addition to a regular inspection of the wards, the Committee, at each of their weekly meetings, have an interview with all Patients who are likely to be discharged during the ensuing week, and ascertain whether they are satisfied with their treatment, or have any complaints to make, and, except in rare instances, the replies have been of the most satisfactory character.

In conclusion, the Committee desire to convey their sincere thanks to the Managers for the confidence they have always reposed in the Committee, and the favorable consideration ever given to their recommendations; the knowledge that they possessed this confidence has much lightened their labours, and rendered their duties a pleasure rather than a toil.

J. A. SHAW STEWART,
Chairman.

A Table showing the Number of Patients sent into the Stockwell Fever and Smallpox Hospitals from the several Parishes and Unions for the Year ending 1st February, 1872.

Unions and Parishes.	Received into the Smallpox Hospital during the Year.	Received into the Fever Hospital from March to August, 1871.	Received into the Fever Hospital from Christmas, 1871, to 31st Jan., 1872.	Total.
St. Saviour's	548	538	25	1,111
Lambeth	698	336	39	1,073
Wandsworth & Clapham	354	289	11	654
Camberwell	240	92	20	352
St. Olave's	133	112	8	253
Greenwich	114	46	2	162
Woolwich	73	14	16	103
Lewisham	26	26	3	55
St. George's Union ..	53	18	..	71
Holborn	5	27	..	32
Kensington	21	8	..	29
Shoreditch	1	26	..	27
Bethnal Green	2	8	..	10
Chelsea	8	..	..	8
St. Marylebone	5	2	..	7
St. Pancras	1	6	..	7
Westminster Union ..	..	5	..	5
Strand	2	2	..	4
Stepney	..	4	..	4
Paddington	1	1	..	2
Fulham	..	2	..	2
Islington	1	..	..	1
Beyond Metropolitan Area	2	2	..	4
Totals ..	2,288	1,564	124	3,976
Deaths	427	253	20	700
Per centage of Deaths	18·6	16·2	16·1	17·6

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SMALLPOX HOSPITAL, STOCKWELL.

REPORT

OF THE

MEDICAL SUPERINTENDENT,

For the Year ending 31*st January,* 1872.

To the Managers of the Metropolitan Asylum District.

Gentlemen,

As you are aware, this Hospital has been in active work for the past twelve months, and this being the first Annual Report issued, I propose to consider, in the first place, the extent to which it has satisfied the requirements for which it was constructed, and to what degree it has alleviated the evils of the serious epidemic through which it is to be hoped we have now passed; in the second place, considering the great advantages I enjoy as Medical Officer of this Institution, I venture to submit to your approval, and to the consideration of the Medical Profession, the results of my experience regarding many important questions yet undecided on the nature and treatment of Smallpox.

For the information of those who are unacquainted with the general plan and management of the Hospital, I shall give a short description of the arrangement of the building; of the accommodation provided for the patients; and shall notice some other important matters connected with its internal administration.

I shall then pass on to consider in detail the following points: the number of Patients admitted during the course

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of the year; their ages arranged in periods of five years; the cases in which vaccination had been performed in infancy, and those in which it had been neglected. These details I shall arrange in a tabulated form. In the same table I shall include the cases which terminated fatally, the relation which they bore to the cases where vaccination had been performed or neglected, the general symptoms which characterize them, and the morbid appearances which were observed in the post-mortem examinations. I shall then make some observations on the localities from which Patients were received; and shall conclude with stating the results of my personal knowledge of the commonest causes of contagion amongst the poorer and thickly-populated districts.

Construction of the Hospital and Cubic Space.

In 1867, the Metropolitan Poor Act was passed, whereby power was given to the Managers of the Metropolitan Asylums District to erect Hospitals, and provide accommodation for the poor of London, when suffering from contagious diseases. Accordingly, this Hospital, intended for the reception of Smallpox cases only, was commenced in August, 1869, and completed in January, 1871.

It is constructed on the Pavilion plan, and may be briefly described as consisting of two parallel wings, each wing containing four large wards, with two smaller ones set apart for the treatment of special cases.

A large and spacious corridor, 307 feet long and 12 feet wide, connects the two Wings. At the entrance to each ward, which is from the corridor, there is situated on one side a nurse's room, overlooking the ward, and on the other a small scullery or kitchen. At the remote end of the

ward, and similarly placed, stand a bath-room and water closet, not encroaching on the ward, but separated by a lobby, provided with a thorough cross ventilation.

The same description applies equally to the other wards. At either end of the corridor there is a Head Nurse's room, and a large well-lighted day-room, used as a sitting and dining-room for the Convalescents. These, together with the reception-rooms, one for the Male and the other for the Female side, embrace the chief features of the Hospital proper.

The Hospital provides for the accommodation of 102 Patients. Each of the eight large wards, of 24,000 cubic feet, contains 12 beds, with a window between each bed. The small wards are large enough to contain 3 beds. During the pressure of the epidemic additional beds were placed in the wards, day-rooms, corridor and landings, thus temporarily raising the accommodation to 180 beds. On the west side of the corridor are situated the laundries, disinfecting chambers, engine house, &c.; and on the east the kitchen, and still further removed, the Administrative Block, where the officers, nurses, and servants reside.

The Hospital is erected on a site which combines the advantages of considerable elevation, a gravel soil, and an atmosphere that is generally clear and healthy.

Mode of Ventilation of the Wards.

The ventilation of the Wards is carried out by means of apertures in the walls, which are situated about 19 inches from the floor, and pass obliquely downwards before communicating with the external air. These openings, one of which is placed between each bed, measure on the inner side 16 by 7 inches, and on the outer 17 by 6 inches; they are

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protected externally by ordinary metal grating, and on the inner or Ward aspect, by perforated zinc plates. About 20 inches from the ceiling there are similar apertures, furnished with Sherringham's ventilators, so arranged by means of a metal trap, to which a weight and pulley is attached, that they can be opened or closed at pleasure.

There are also outlets near the ceiling, through which the impure air passes, enters a shaft, and is thence carried above the roof. By this arrangement, in conjunction with the cross ventilation from the windows on either side, an abundance of pure air can be admitted, and freshness of atmosphere maintained.

Heating of the Wards and Corridors.

The heating of each Ward is effected by two single-grated stoves, placed in the central line of the Ward, so that all parts are kept of an equal and uniform temperature.

The smoke is carried off by shafts which pass through the centre of the Ward from the basement to the roof of the building, and with which the stoves are connected. The temperature has been maintained throughout the year, from 58 to 60 degrees Fahrenheit. The corridor is heated by hot water passing through a series of circulating pipes and coils. With regard to the lighting, I have only to say, that each of the large globes (of which there are two in every Ward), contains three gas burners, and communicates with an escape pipe, through which the products of combustion are conveyed, and thus the purity of the atmosphere is further preserved.

The supply of hot and cold water in the bath-rooms, lavatories, and other parts of the building, has been satisfactory, and fully sufficient for all requirements.

Mode of Conveying Patients to and from the Hospital.

The duty and responsibility of conveying Patients to the Hospital with safety and comfort, devolves on the Parish or Union from which they are sent. As there are certain defects in this system, which I have reason to believe require serious attention, I venture to offer a few remarks on the precautions which I think ought to be observed in this respect. In justice, however, to the parochial authorities, it may be said that a great and sudden pressure arose, for which they were not prepared; and they therefore made the best arrangements they could under the circumstances. The only means at their command were very insufficient; for they were obliged to supply themselves with very imperfect vehicles, in which the Patients could not assume the recumbent posture, and receive that attention during their removal to the Hospital which is so necessary in cases of great debility, and where the disease is far advanced. I have already taken an opportunity of bringing under the notice of the Board the dangerous practice of allowing two or three friends, and sometimes more, to ride long journeys shut up in a close vehicle, together with the Patient, and then to return to their homes in the same poisoned atmosphere, thus subjecting themselves to the risk of contracting a disease—to which they are very liable, as they, for the most part, belong to that class who either wholly disregard or neglect to avail themselves of the protective power of vaccination and re-vaccination. Another matter to which I would refer, is the want of separate carriages for the removal of Patients when fit to be discharged. Previously to their being certified as fit

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for discharge, great pains are taken to ascertain that the Patients themselves, and the clothes which they had worn when admitted, are free from infection; yet it has sometimes occurred that they have been removed in an Ambulance, which a few minutes before had conveyed a fresh case of Smallpox to the Hospital. This latter evil has been brought under the notice of the Managers by Dr. Gayton, the Medical Superintendent of the Homerton Smallpox Hospital. Although, in such a case, there may be no danger to the Patients themselves, there exists grave apprehension that they may be unconsciously the means of bearing infection in their clothes, and thus spreading disease, if not death, in their homes and amongst their own friends, and thus nullifying the precautions taken at the Hospital. I am glad, therefore, that the Managers have given their attention to these all-important matters, and hope that their interference in behalf of the suffering poor, will bring about an improved condition of Ambulances, calculated to insure the comfort of the Patients during their transfer to the Hospital, as well as safety to the public after their removal.*

Mode of Disinfecting Patients' Clothes.

The process of disinfecting the Patients' Clothes is carried out in a small brick chamber heated by a furnace. A large metal door forms the entrance, and in this is placed a thermometer indicating the internal heat. Along the whole length

* Since this Report was written, the Managers have themselves undertaken the removal to their own homes or to the workhouses of such recovered patients as may require it.

of the chamber near the top, on either side, run two iron bars, on which there are four transverse moveable rods, and from these the clothes are suspended.

Four suits can be disinfected at a time, and each article is opened out separately and subjected to a heat of 230° Fahrenheit, for half an hour. After undergoing the above process the clothes are folded up, with the name of the owner attached, and placed in a wooden shed, through which a constant current of air is passing.

Having had an opportunity of seeing another disinfecting apparatus at the Fever Hospital adjoining, generally known as Nelson's, I feel convinced that it is superior in all respects to the one in use here, as it is heated by gas, can be raised more speedily to the required temperature, and is less expensive in the consumption of fuel.

Nursing.

As far as practicable Nurses with previous Hospital experience have been selected. A Day Nurse and a Night Nurse are attached to each large and special Ward; and there are, in addition, two Head Nurses, and a Night Superintendent of Nurses; each of the former has charge of one wing during the day, and during the night the responsibility of the entire building devolves on the latter.

The duties of the Day Nurse commence at half-past 7 in the morning and continue till 9 at night, when the Night Nurse comes on duty, and remains till 9 the following morning; so that the early arrangements are effected between them. According to the rule adopted here, namely, of treating the severe cases with and in the same ward as the Convalescents, this number of Nurses was found amply

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sufficient. The staff of Nurses did not enjoy a complete immunity; two suffered from Smallpox, both of whom recovered. One of them having had an attack of that disease six years before, it was not thought necessary to re-vaccinate; the second was re-vaccinated on arrival at the Hospital, but, no doubt, the poison was in the system before it could take its proper effect; it nevertheless modified the disease to such an extent, that it was not found necessary to confine her to her bed for a single day. This result must be looked upon as a satisfactory proof of the efficacy of re-vaccination,—these being the only cases in which the disease appeared amongst those engaged in the service of the Institution; the number of whom, including Officers, Nurses and Servants has been 93.

Medical Report.

During the past year 2,288 Patients have been admitted, 1,733 were discharged recovered, and 427 died. The monthly admissions have undergone considerable variation; from 201 in February, they fell to 173 in March, then they rapidly increased, to 238, 318 and 258 in April, May and June respectively. In July there was again a falling off, which may be said to have continued to the end of November, being in July 192, August 189, September 128, October 146, and November 127. An increase took place in December, during which month 192 were admitted, the largest number since July. In January, the last month of this Report, 126 were received.

In the following No. 1 Table, the total monthly admissions, discharges and deaths are given during the 12 months, commencing 31st January, 1871, and ending 31st January, 1872:—

No. 1. TABLE.

Months.		ADMISSIONS.				DEATHS.				RECOVERED.			Convalescents transferred to Hospital.—Invalided.—Absconded.—Other causes. Chaplain.			Monthly Average Number in Hospital.			
	Age.	Males.		Females.		Males.		Females.		Males.	Females.	Total.	Males.	Females.	Total.	Highest.	Lowest.	Males.	Remaining in Hospital 31st January.
		Over 10.	Under 10.	Over 10.	Under 10.	Over 10.	Under 10.	Over 10.	Under 10.										
February		26	15	28	10	17	9	9	2	29	15	44	1	1	2	141	82	86	129
March		15	6	29	14	13	7	6	1	22	16	38	1	1	2	154	114	104	
April		136	23	120	19	24	6	22	3	86	80	166	14	15	29	183	119	111	
May		137	31	126	24	24	9	15	3	90	79	169	14	9	23	175	130	123	
June		85	11	93	29	23	6	13	3	43	79	122	9	9	18	130	104	105	
July		60	12	69	31	15	3	6	2	43	54	97	7	6	13	134	97	88	
August		60	10	61	58	11	3	4	2	38	42	80	6	5	11	128	88	115	
September		59	12	57	40	8	2	3	1	38	36	74	5	5	10	113	88	102	
October		62	12	43	41	15	2	3	1	43	37	80	5	5	10	113	88	112	
November																			
December																			
January																			
Totals		1,107	145	861	343	194	48	81	18	433	438	871	62	56	118				

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In Table No. II. the Patients are arranged in periods of 5 years, showing the number of the vaccinated and unvaccinated, together with the mortality occurring in each period.

No. II. TABLE.

Under	ADMISSIONS. MALES. Vac.	Unvac.	FEMALES. Vac.	Unvac.	DEATH. MALES. Vac.	Unvac.	FEMALES. Vac.	Unvac.	MORTALITY PER CENT. IN EACH CLASS OF CASES. VACCINATED. Males.	Females.	Combined Average.	UNVACCINATED. Males.	Females.	Combined Average.
5 years	17	27	21	39	2	17	22	22	11·7	9·5	10·5	62·9	56·4	59·0
5 to 10	57	44	63	32	9	20	12	12	15·8	11·1	13·3	45·4	37·5	42·1
10 to 15	111	18	122	19	9	9	8	8	8·1	5·7	6·8	20·0	42·1	45·9
15 to 20	204	17	311	15	13	15	12	7	6·4	7·7	7·1	76·4	73·6	73·5
20 to 25	254	14	316	15	23	25	15	11	9·1	10·5	9·8	78·5	66·6	69·1
25 to 30	152	10	93	15	22	10	10	6	13·1	10·8	12·3	100·0	60·0	80·0
30 to 35	103	5	53	13	13	13	4	9	16·5	24·5	18·5	80·0	69·2	72·2
35 to 40	68	6	47	2	2	6	3	2	19·1	17·0	18·2	100·0	100·0	100·0
40 to 45	35	1	34	2	2	1	10	2	25·7	29·4	27·5	100·0	100·0	100·0
45 to 50	16	4	11	2	1	3	1	1	31·2	9·1	22·2	75·0	50·0	66·6
50 to 55	8	2	12	..	1	1	1	..	12·5	41·6	27·0	50·0	..	50·0
55 to 60	8	..	7	..	..	..	..	..	..	14·2	20·0	..	..	..
60 to 65	3	..	2	..	..	..	..	..	..	50·0	20·0	..	..	..
65 to 70	3	..	..	..	..	..	..	..	..	..	..	..	..	..
70 to 75	2	..	2	..	..	..	1	..	50·0	..	50·0	..	..	..
75 to 80	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	1,084	168	882	154	126	110	106	85	11·6	12·0	11·8	65·4	55·2	59·5

Mode of stamping out Smallpox.

On reading over the above figures, one circumstance cannot fail to attract your attention: viz., the large number of deaths occurring in the unvaccinated, as compared with the vaccinated, even unsatisfactorily as the process is carried out in London. I would also specially call attention to the great value of Re-vaccination, as affording almost certain immunity from the disease, for I may state that not a single case, where undoubted successful re-vaccination had been performed, presented itself for admission. Under any circumstances, whether an epidemic prevail or not, this important fact ought to rouse us, and, having such safe and powerful means at our command, urge us not only to retard, but to stamp out altogether the presence of a malady so fatal and repulsive. And now it may be asked, how this end is to be attained? The question has often been answered; by a prompt, compulsory house-to-house re-vaccination, and, as far as possible, the complete isolation of those already affected, by removing them to some Hospital provided for the treatment of such diseases, as well as the immediate and thorough disinfection of the sick chambers from which they have been removed. Of the great importance of complying with the first condition, namely, vaccination and re-vaccination, nothing need be said. Of the second, namely, the isolation of the Patients, I fully concur in the statements contained in Dr. Seaton's admirable handbook of vaccination, where he says—"When an airy room can be given up to a case of Smallpox, there will be no necessity whatever to move the case to a Hospital, even where the opportunity for such removal exists; but where, as among most of the labouring class, &c., there are no such means of isolation, but the case would have to remain in a room to which many must have

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access, and in which, perchance, some part of the family, or perhaps the whole family might be sleeping, if not altogether living, removal to a Hospital or place of proper isolation is of the utmost consequence, and wherever it is practicable, should never be omitted." To the third condition, namely, the thorough disinfection of the sick chamber from which a Patient has been removed, I must especially direct the attention of the Managers, as I am strongly of opinion, from various enquiries made both from the Patients themselves at their houses, as well as when visiting their friends, that although a matter deserving the strictest attention, it is but very imperfectly carried out. Illustrative of the above, I may mention the following instances out of many. On asking a mother, during her visit to this Hospital to see her children, if any steps were taken to disinfect her dwelling, or if she received any instructions to that effect, she replied that she had received no instructions, but, at the suggestion of a neighbour, she had applied at the vestry, and obtained some chloride of lime, which she sprinkled over the room; and this she looked upon as a sufficient precaution. The second case was as follows—after the removal of a member of a family of 4 or 5 in number, some disinfectants were thrown about, and the apartment shut up for a few hours. The same night the room was occupied by the remainder of the family, who, not long after, were attacked with smallpox, and admitted into the Hospital. In referring to the above suggestion, I am quite aware of the many difficulties to be encountered, and the disagreeable duties to be performed by the parish authorities; and I cannot help expressing my conviction that the proper disinfection of houses cannot be efficiently carried out as long as the inmates reside in them, and that too onerous duties

are imposed on those intrusted with the parochial sanitary arrangements.

About each form of the disease, I now propose to make a few general remarks.

Forms of Smallpox.

Although much has been written, hitherto, about Smallpox, its varieties, eruption, and treatment, it may not be wholly uninteresting to place before you in this Report, a brief account of the principal forms of that disease, as seen at this Hospital during the past twelve months. Of the "benign" form of Smallpox, or that occurring for the most in those protected by vaccination, but not sufficiently so to ward off the disease entirely, little need be said. The mildness of the premonitory symptoms, the course which it runs, and its almost absolute freedom from a fatal termination, renders it little alarming, except in the danger of its extending to others.

The "confluent," or that form in which the pustules run into each other, deserves more attention; not only on account of the greater mortality, the increased suffering, and protracted convalescence, but in consequence of the permanent serious injury that so frequently results.

In this, the "confluent" form, the premonitory symptoms are of grave import; the headache, furred tongue, vomiting, and pain in the back, of such slight moment in the former, are now much more severe. In consequence of the disinclination to apply for relief prevailing among the labouring classes, Patients are not brought under notice until the fourth or fifth day after the appearance of the eruption, and sometimes not till

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the seventh or eighth day, when the more urgent symptoms show themselves. A sufficient number, however, have been under observation, to enable me to state the usual progress of such cases, from the beginning to their termination. It is well known, that in these cases the eruption may be confluent on the head and face, and sparse on the chest and extremities; or, what is still more dangerous, this confluent condition may exist over the entire surface of the body. On arrival at the Hospital, the patient usually complains of sore throat and pains in the back. The face is very often of a deep red colour; and by passing the finger over it, numerous minute and closely aggregated papules may be felt beneath the skin. The appearance of the eyes, and the general expression of the countenance, even at this early period, are often characteristic, and denote approaching delirium, so as to enable proper precautions to be taken in the treatment of the case. The soreness of the throat, almost an invariable complication, usually passes away in from 48 to 72 hours, but the presence of the eruption on the tongue, throat, and fauces very often causes great difficulty of deglutition.

The delirium before mentioned generally sets in towards the evening, and may continue throughout the disease, or pass off in from 24 to 48 hours. The pulse varies from 100 to 110; the temperature is about 100°, and the respirations not much above the average. During the further progress of the disease, swelling of the face and eyelids sets in, and the patient cannot be readily recognized. There is in many cases a copious discharge of viscid mucus from the throat, so that the sufferer is constantly struggling for breath, and is in fear of suffocation. This condition is attended with considerable risk when occurring in children.

During the first seven or eight days of the eruption, the swelling of the face, sore throat, and the painful condition of the body from so large an extent of irritation, render the patient restless and irritable. He is unable to take a proper amount of sleep, without which, should he not succumb to the severity of the attack before the advent of the secondary fever, which occurs at the period when the pustules begin to discharge their contents, he is rendered unable to bear up against the exhaustion that occurs at this stage of the disease.

This is the most critical period: the pulse ranges from 120 to 130, the temperature from 103° to 106°, and in some cases even this temperature is exceeded; the respirations are hurried; then commences a craving for liquids, and a thirst which cannot be allayed; the restlessness becomes aggravated, and continues without intermission. This deplorable condition of the sufferer stimulates one to use every exertion to give relief; but I regret to say, I know of no plan of treatment which succeeds in allaying the serious symptoms I have described.

In some less severe cases, the secondary fever passes off after a few days, the pulse and temperature subside, and a gradual return to health takes place. Should not this desired result occur, many serious complications may arise, still further endangering life, or threatening to afflict the unfortunate sufferer with those lamentable sequelæ which too often set in. The principal of these are ulceration of the cornea, with loss of sight; otitis, resulting in permanent deafness; and other complications, such as pneumonia, pleurisy, bronchitis, peritonitis, and gangrene of the scrotum. Should the patient be unfortunately attacked with either of the latter affections,

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the fatal termination soon arrives, and puts an end to his misery. The system, already weakened by a disease so exhausting, is readily overcome by the advent of a second equally serious.

In that form of the disease, which may be called "suppressed," but which is only a variety of the "confluent," differing from the latter, as its name implies, in the eruption being scarcely perceptibly raised above the skin, the surface generally assumes a pale, pasty appearance, and this variety is attended with a greater amount of prostration from the commencement. No attempt at maturation is apparently made; large blebs, containing a serous-looking fluid, form on the hands and various parts of the body; there is rarely any swelling of the face, as in the other variety; and it is almost as surely fatal as the third or "hæmorrhagic form," of which I have now to speak.

The "Hæmorrhagic" form resembles, in its premonitory symptoms, those already mentioned, but is nearly always fatal. The Patient's appearance on admission is characteristic; the face is of a more or less purple colour, which very soon becomes intensified; the eyes are injected, and an effusion of blood subsequently occurs beneath the conjunctiva, either in patches or entirely surrounding the cornea. Petechiæ are found, more or less numerous, according to the severity of the disease, occupying, in all cases, the groins and lower part of the abdomen, and frequently the outer surface of the thighs, as well as the axillary and clavicular regions.

As the disease advances, the face becomes swollen; black patches, due to effused blood, appear on the forehead, and soon extend over the face. Hæmorrhage from the mucous membranes, sometimes slight, but often in alarming quantities,

sets in, and the breathing, imperfect in the commencement, becomes rapidly impeded. The eruption, if any, consists of a few vesicles, which rarely pass beyond that stage. Throughout the disease the condition of the Patient is one of agony and distress, and, unfortunately, little can be done either to relieve the symptoms or conduce to recovery.

Death generally takes place about the fifth day, and sometimes as early as the third. The pulse ranges from 120 to 140, the temperature from 101° to 106°, and in the cases which came under my notice, both fell about 24 hours before the fatal termination.

I now place before you a few typical cases of the varieties above described. The points to which attention is principally directed are the Temperature and Pulse.

No. 1.—Severe Confluent Smallpox.

S. S., æt. 34, Boilermaker, a strong, muscular man, was admitted on 7th March, the second day of the eruption. On arrival at the Hospital his face was somewhat flushed, and he complained very much of sore throat. His eyes were slightly injected, and numerous papules, small and closely set, could be distinctly felt on the face.

The eruption was confluent over the entire surface of the body. He had two very indifferent primary vaccination marks on the left arm. Temperature at 9 p.m., 102°·1; Pulse 98. He was placed on low diet, which consists of milk, beef tea, and arrowroot. 8th, at 10 a.m., T. 101°·2, P. 96, had passed a restless night, but took his nourishment well. At 3 p.m., T. 101°·4, P. 98.; 11 p.m. gave him a Hydrate of Chloral draught (30 grains), but this did not appear to give any relief. 9th, 10 a.m., T. 100°·3, P. 100; 3 p.m., T. 102°·4,

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P. 100. 9 p.m., T. 103°·1, P. 106. 10th, 10 a.m., T. 102°·1, P. 110; slept fairly during the night, eruption on face beginning to crust, but of a pale colour on body and extremities. 11th, 10 a.m., T. 102°·2, P. 100; 3 p.m., T. 104°, P. 106, Patient suddenly became restless and wandering. 12th, 10 a.m., T. 104°·1, P. 120; during the night great difficulty had been experienced in administering nourishment. 13th, 10 a.m., T. 106°·2, P. 132. Died at 2 p.m. on the 8th day of eruption.

No. 2.—Also Severe Confluent Smallpox.

T. G., æt. 24, Groom, was admitted on 4th March, being the second day of the eruption. This Patient complained of sore throat and severe pains in his back, and stated he had been vaccinated, but there were no marks visible. He had lately come from the country, and was apparently a very healthy man. At first the eruption did not appear copious, but subsequently developed into a severe confluent form. March 5th, 10 a.m., T. 99°, P. 96, had no sleep during the night, and stated he had no rest for the last three nights. 6th, 10 a.m., T. 99°·2, P. 98; 3 p.m., T. 100°·2, P. 96. 7th, 10 a.m., T. 101°·2, P. 98; 3 p.m., T. 100°·2, P. 106. 8th, 10 a.m., T. 100°·4, P. 110, passed a restless night, talked in his sleep about his horses, &c., but took drink freely. 9th, 10 a.m., T. 102°·2, P. 116; 3 p.m., about the same. 10th, 10 a.m., T. 103°·2, p. 120, passed a better night, but seemed rather desponding, and did not think he would recover. 11th, 10 a.m., T. 104°·0, P. 120; 3 p.m., T. 104°·3, P. as before. 12th, 10 a.m., T. 103°·1, P. 130, small and jerking, ordered, in addition to his low diet, two eggs and 8 ozs. Port wine. 13th, 10 a.m., T. 103°·0, P. 128, seemed a little better and took more nourishment. 14th, 10 a.m., T. 102°·3, P. 120,

passed a quiet night, and was evidently improving. 15th, 10 a.m., T. 102°·2, P. 120. 16th, 10 a.m., T. 101°·3, P. 110. 17th, 10 a.m., T. 100°·4, P. 106. 18th, 10 a.m., T. unusually low, being 97°·0, P. 100. 19th, had an attack of shivering during the day; Temperature, at 8·30 p.m., rose to 105·2; and on the following morning, 20th, he had an attack of Erysipelas in right leg, to which fomentations were ordered; his temperature had fallen to 101°·3. 21st. Leg much swollen, T. 100°·4, P. 98, ordered 8 ozs. brandy and 4 eggs (wine omitted). 22nd, 10 a.m., T. 100°·0, P. as before, leg less painful, and Patient expressed himself much better. 23rd, 10 a.m., T. 99°·0, P. 98, slept well, and asked to be placed on meat diet; no unfavorable symptoms occurred during convalescence.

No. 3.—Hæmorrhagic Smallpox.

M. S., æt. 30, single woman, was admitted on Feb. 8, first day after appearance of the eruption. Previous to this attack, I was informed by her friends that she never had any illness, but was always strong and healthy. She was born in London, and lived in a very healthy locality. Had three faint marks of primary vaccination. On her arrival at the Hospital her face was observed to be of a dark appearance, and rather puffy; her eyes were injected, and she seemed in a very weakly condition. 8·30 p.m. her temperature was found to be 104°1, P. 120, R. 36. 9th, 10 a.m., T. 104°·0, P. 110, R. 40; had no sleep during the night, and, from the difficulty of breathing, could not rest long in one position; 3 p.m., T. 104°2, P. 116, R. 38; 10th, 10 a.m., T. 103·3, P. 120, R. 30, complained of great pain in the lower part of the abdomen, and subsequently uterine hæmorrhage set in; 3 p.m., T. 103°2, P. 126, R. 34;

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haemorrhage increased very much, and no doubt could be entertained that the fatal termination was not far distant: 8 p.m., T. 102°·4, P. 136, R. 36; death took place at 2 a.m. on 11th. In the treatment of this case the usual astringents were employed, but without producing any beneficial result.

No. 4.—Hæmorrhagic Smallpox.

H. C., æt. 22, Servant, admitted August 26th. Had two good primary vaccination marks. A few vesicles appeared on 24th, and two days afterwards she was received into the Hospital. On admission she had the usual symptoms, sore throat, &c. Her tongue was coated and eyes injected. 27th, 10 a.m., T. 101°·4, P. 120, a number of small umbilicated vesicles were to be seen on the face, which was dark and swollen. 28th, 10 a.m., T. 103°·2, P. 126, lost a large quantity of blood from the uterus during the night; 3 p.m., no alteration in the symptoms, but refused to take any nourishment. 29th, 10 a.m., T. 104°·0, P. 140, passed a restless night; face purple and swollen; the vesicles were of a general slaty blue appearance. In afternoon had, at frequent intervals, suffered from great restlessness, apparently hysterical, marked by a loud stertorous breathing, groaning, and upturned eyes. 30th, 10 a.m., T. 105°·2, P. 138, breathing much more distressed; died in the afternoon, the 6th day of the eruption. In this case, also, uterine hæmorrhage ensued, but not to such an extent as in the previous case.

No. 5.—Suppressed Smallpox.

J. S., æt. 29, admitted March 5th, the fourth day of eruption. On arrival at the Hospital he was found to be suffering from an eruption, scarcely raised above the skin, and of a pale, whitish appearance. He complained of sore throat, as

met with in other confluent cases. 5th, 8 p.m., T. 101°·2, P. 98. 6th, 10 a.m., T. 100°·1, P. 98; did not sleep during the night, but took his nourishment fairly; 3 p.m., T. 101°·0, P. 100; 8 p.m., T. 101°·4, P. 110. 7th, 10 a.m., T. 101°·3; Pulse as before; ordered a mixture of Strychnine and Iron every four hours; 3 p.m., T. 102°·0, P. 106; 9 p.m., T. 102°·4, P. 110. 8th, 10 a.m., T. 101°·2, P. 120, appeared very low; ordered 12 ozs. port and 4 eggs; 3 p.m., T. 101°·2, P. 110. 9th, 10 a.m., T. 102°·2, P. 116; 3 p.m., T. 102°·2, P. 110; 8 p.m., T. 102°·4, P. 120. 10th, 10 a.m., T. 103°·4, P. 136, was delirious during the night, and constantly endeavouring to leave his bed. 11th, 10 a.m., T. 105°·2, P. 140; ordered the following mixture—Quinæ Disulph, grs. v., Acid. Sulph. dil; M. xv. and aqua, Camph. ℥ j, every four hours; 3 p.m., T. 107°·1, P. 130. Died at 9·30 same evening.

It is right to mention, that of the 2,288 Patients admitted and treated to their termination, 7 of those left under treatment on the 31st January last subsequently died, in addition to those mentioned in the Statistical tables, thus raising the percentage to 18·9. Deducting, however, 4 dead on arrival at the Hospital, 26 who died within 24 hours, and 38 within 48 hours after admission, and who cannot be fairly reckoned as having been under treatment, the percentage is reduced to 16·1. Deducting 10 patients who died of other diseases following Smallpox, the mortality is still further reduced to 15·7 per cent.

Treatment.

The mode of treatment pursued at this Hospital may be briefly referred to. In the early and acute stage, Salines, Diaphoretics, &c., were administered, while the food consisted

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principally of milk, beef-tea, and arrowroot In the later stages, as exhaustion came on, port wine and eggs, and brandy and eggs, were given in addition. Various medicinal agents have been employed in severely confluent and hæmorrhagic cases, in the hope of cutting short or lessening the severity of the secondary fever in the former, and relieving the fatal hæmorrhagic tendency in the latter. The following drugs have had a fair trial; and, although at first impressed with their usefulness, further experience has only served to convince me, that they exercise no marked or beneficial effect on the disease. Quinine in small and large doses, Strychnine alone, and in combination with iron, Chlorate of Potash and Turpentine, have been used, and I must state that, after the treatment of over 2,000 cases, their efficacy is not very apparent. Of the administration of stimulants, except when a great degree of exhaustion is present, such as may arise from a long continued illness, or from the supervention of other diseases, I have formed the same opinion.

The external applications used were Olive Oil, Glycerine, and Carbolic Acid, Collodion and Castor Oil, Sulphur Ointment, with Oxide of Zinc and Nitrate of Silver. The latter of these I have found the most effectual in preventing the pitting and in drying up the offensive discharges, which occur in some of the worst cases. Lately, instead of confining this application to the face, I have applied it to the entire surface of the body, and I have reason to think, that it not only serves to diminish the amount of disfigurement, but also exercises a beneficial influence over the course of the eruption, and, consequently, the disease itself. More extended experience, however, is required before speaking with any certainty as to its results.

POST-MORTEM APPEARANCES IN THE VARIOUS FORMS OF SMALLPOX.

No. 1.—Severe Confluent Smallpox.

There is no condition of the internal organs in this form of the disease which requires special notice, with the exception of the intestines, which are seriously affected in some cases with the variolous eruption. The lower part of the small intestine and the large intestine are the parts in which this principally occurs. The surface is covered with numerous slightly elevated white spots, in some parts situated close together, in others isolated. There is no depression of the centre, nor are the glandular structures of the intestine particularly the seats of eruption. The elevation is due in great measure to effusion into the sub-mucous tissue, as was easy to observe on making microscopic sections of the diseased parts. To some extent it was also due to an increase in the number and size of the epithelial elements.

Suppressed Smallpox.

The morbid appearances are by no means well defined, beyond the fact, that there is observed that general condition which is met with in diseases of a similar character to variola, and where it is generally admitted that the fatal termination is due to the influence of a morbid poison. The lungs are nearly always congested, and contain frothy fluid; the inferior parts being most affected. The heart has no signs of recent disease. The blood is found fluid, both in the ventricles and auricles. The liver and kidneys are rather softer and paler in

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colour than is usually found; the secreting structures are well marked and contain an excess of oil globules.

Hæmorrhagic Smallpox.

In this variety the lungs and heart are in the same condition as in the last class of cases. The liver is more anæmic, softer, larger than is natural and more oily, and the kidneys are affected in the same manner. The tissues in which the chief changes are observed are the serous and mucous membranes. The mesentery presents an unusual colour; it is stained universally of a brownish red tinge, and may be compared to the well-known appearance often seen on the internal surface of the aorta. This appearance does not depend as far as could be ascertained on diffusion of the blood corpuscles in the tissues, and their destruction may be regarded as one of the effects of the poison. Loose coagula are sometimes seen in the pelvic cavity in women, where the delicate termination of the Fallopian tubes appears to be the source of the hæmorrhage. No actual lesion, however, was discovered to account for the hæmorrhage in the cases examined. With regard to the mucous membranes, particularly that of the vagina, their surfaces present no evidences of lesion, but there are numerous small collections of extravasated blood in the sub-mucous tissues, though actual rupture of the blood vessels is not observable. This brief account of the changes observed in the various organs and tissues of the body from the effects of the variolous poison, is presented to your notice with considerable hesitation, as I am well aware, how imperfectly I have been able to carry out investigations into the pathology of the disease.

Remarks on the Cases in which Delirium occurs, and Method of Treatment.

Before concluding the Medical part of this Report, I wish to make some remarks on the importance which is to be attributed to the symptom of delirium, and on the method of treatment which I have generally adopted and found most successful. I have rarely met with it in cases of "Discrete" Smallpox, and never in the Hæmorrhagic form; and whenever it does occur in the former, it is usually of short duration, and unattended by serious consequences. In "Confluent" Smallpox, however, at two periods of the disease, namely, on the first or second day of the eruption, and at the time when the secondary Fever is commencing, that is to say, about the 8th or 9th day, it is usual for delirium to show itself. This disturbance of the mental faculties is liable to assume a variety of forms. In some, the mind is so little affected, that only very gentle means are necessary to control the Patients, while in others, there is such a complete loss of self-restraint, that much stronger measures must be resorted to, not only for the safety of the Patients themselves, but also for that of their Attendants and those around them. It is obvious that the cases in which delirium occurs, are those which require the most attention and create most anxiety.

There seems to be in a large proportion of these cases a strong inclination to escape from all restraint. To effect this, they take advantage of any opportunity which remission in careful watching may afford, or, failing in this, will resort to the most violent efforts to accomplish their purpose.

This tendency requires different modes of treatment on the part of the Attendant. With regard to the effects of

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any medicinal remedies in diminishing it, I think I may say consistently, that there are none to be relied upon. It is often possible to control the Patient by moral influence, without resorting to forcible means of restraint; but it is in the treatment of violent cases that the greatest difficulty is experienced, and to this class I now confine my remarks. The two methods usually employed are, either to have a sufficient number of Attendants to overcome the efforts of the Patient, or to use some mechanical means of preventing him from leaving his bed; and this is best accomplished by folded sheets, fastened to the bed on either side, and passing over the chest and extremities.

I am in favour of the latter plan for the following reasons:—In the first place, the actual state of excitement and restlessness seems to be increased by the presence of several persons in immediate attendance on the Patient; secondly, it is of the greatest importance to diminish as much as possible any kind of injury to the surface of the body, which is to some extent unavoidable, and certainly more likely to occur from the exercise of manual force, than from the softer pressure of broad folds of linen sheets. When such means are employed, care, of course, must be taken that the sheets produce no injurious pressure, and this is best prevented by fixing them over the bed clothes, so that they are not in direct contact with the body. In this way, the presence of one Attendant at the bedside is quite sufficient.

Between 40 and 50 cases of violent delirium came under my notice; and having frequently tried both plans, I feel quite satisfied that the method I have spoken in favour of, is the safer and more humane.

On Vaccination.

In some of the cases I have entered in the Tables as having been vaccinated, I feel great doubt whether the operation had been properly performed. Wherever a mark was clearly discernible on the arm, and was reported by the Patient himself, or his relatives, as having been the result of vaccination, I have assumed, that such was the case; but the mark was often so faint, and possessed of so few or none of the characteristics which belong to a successful vaccination cicatrix, that I am inclined to think the operation is very often inadequately performed, and that a large number of those presented at our Hospitals "as vaccinated cases," were not protected at all.

When, therefore, a considerable mortality occurring from Variola, is seen amongst those reported in Statistical Tables as having been vaccinated, great allowance must be made for the correctness of any conclusion formed from them; for I feel convinced, that not more than 20 per cent. of all the cases admitted into the Hospital bore cicatrices of vaccination undoubtedly genuine.

Prejudices against Vaccination.

It may be interesting to examine the reason why certain prejudices are entertained by the poor against the Vaccination of their children. One of the most common of these arises from the belief, that injurious effects are produced on the constitution of the child, by the introduction of matter which has been taken from a diseased subject; and in support of this view, cases are constantly brought forward, in which constitutional diseases, particularly cutaneous eruptions, have been said to follow vaccination. It is not at all uncommon to

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hear the mothers of children asserting, that the eruption on the skin for which they are asking advice, followed after vaccination in a very short time, and in their minds is not unnaturally attributed to that cause. I have also reason to believe that, occasionally, re-vaccination has been performed in cases where well-marked symptoms of the disease have already shown themselves, even after the appearance of the eruption. As an instance of this, a rather severe case came under my treatment.

Before concluding this part of my Report, I have to refer to the unsettled state of medical opinion as to the length of time a patient should be retained in the Hospital before all danger of infection is passed; and upon this I will simply say, that the rule adopted at this Institution has been to retain patients until desquamation is complete, the secretions and excretions are healthy, and the pulse and temperature becomes normal.

This plan has been followed in the treatment of over 2,000 cases, and in no instance has it given rise to any unfavorable result to deter us from a continuance of the practice. In compliance with this rule, the time of detention in Hospital may be said to vary with the severity of the case.

In a case of modified Smallpox, the above indications are fulfilled in about 21 days, whereas, in severe confluent cases, the same end is not attainable in less than eight or ten weeks.

Therefore, it is clear, that the average period during which a patient should remain under treatment ought to be regulated by the particular form and severity of the case; and the precautions taken seem to have been sufficient to obviate all danger of the patients carrying infection to others, or suffering personally from any of the consequences of the attack.

No. 3 TABLE.

Total Monthly Admissions from each Parish or Union during the year ending 31st January, 1872.

PARISH OR UNION.	Feb.	Mar.	April	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Totals.
Lambeth	61	48	77	102	65	80	49	37	36	43	61	39	698
St. Saviour's	46	50	47	76	79	23	66	32	51	31	31	16	548
Wandsworth and Clapham	30	37	48	64	54	27	25	33	32	15	22	7	354
Camberwell	16	11	11	24	43	28	26	16	8	9	27	21	240
St. Olave's	6	14	3	21	25	23	12	3	10	7	8	1	133
Greenwich	10	4	11	23	7	9	7	4	5	7	13	14	114
Lewisham	3	1	3	1	4	1	1	2	3	3	6	9	35
Woolwich	1	4	14	2	2	2	1	1	3	12	24	19	74
St. George's	27	8	7	3	2	1	1	. .	. .	. .	. .	. .	53
Kensington	8	6	3	. .	. .	1	. .	. .	. .	. .	. .	. .	21
Holborn	. .	. .	. .	. .	1	. .	. .	. .	. .	. .	. .	. .	1
Chelsea	2	. .	5	. .	1	. .	. .	. .	. .	. .	. .	. .	8
Bethnal Green	. .	. .	1	. .	. .	. .	1	. .	. .	. .	. .	. .	2
Marylebone	. .	. .	5	. .	. .	. .	. .	. .	. .	. .	. .	. .	5
Shoreditch	. .	. .	1	. .	. .	. .	. .	1	. .	. .	. .	. .	1
Islington	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	1
St. Pancras	. .	. .	1	. .	. .	. .	. .	. .	. .	. .	. .	. .	1
Paddington	. .	. .	. .	1	. .	. .	. .	. .	. .	. .	. .	. .	1
Strand	1	. .	. .	. .	. .	. .	. .	. .	1	. .	. .	. .	1
Beyond Metropolitan Area	. .	. .	1	1	. .	. .	. .	. .	. .	. .	. .	. .	2
TOTAL	201	173	238	318	258	192	189	128	146	127	192	126	2288

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Locality of Smallpox and mode of Spreading.

With regard to the localities in which Smallpox principally existed, and to the mode of its dissemination, I have now to express my opinion, not derived from hearsay, but based on experience derived from a personal inspection of the streets, and in many cases, of the houses in which the disease prevailed. That Smallpox has been confined, in the majority of cases, to the poorer classes does not admit of any doubt, and when we consider the circumstances and surroundings under which they live, we cannot be surprised to find them an easy prey to an epidemic disease such as the one now under consideration. Time has not allowed me to pay more than a few hurried visits to the parishes or unions allocated to this Hospital; but each successive visit strengthened my conviction that in the poorer streets where once Smallpox gained a footing, it there formed its stronghold, and diffused the poison around. I will briefly state a few of the cases that came under my notice. Whilst passing through one of those streets situated in a poor neighbourhood, in answer to my inquiries a house was pointed out to me as containing a case of Smallpox. I gained admission, and saw the patient. The dwelling consisted of six small ill-ventilated rooms, and on inquiry, I found, to my surprise, that there were 13 human beings in that wretched place, all unprotected by re-vaccination. At the date of my visit, the sufferer, a married woman, aged 37, and her husband, occupied a room on the ground floor. She was in a most pitiable condition, having lost both her eyes, and being afflicted with bad bedsores. Her husband was her only nurse during her illness, extending over six weeks. In the two rooms above, lived another family,

consisting in all, of seven members, and on the floor above that, lived a family of four; in the two latter, Smallpox made its appearance, as one would expect. The first floor had been previously occupied by another family of five people, and amongst them also Smallpox broke out, proving fatal in two cases. Before leaving this case, I may mention that daily visits were interchanged between the members of this household and their friends living in another parish some distance away; the consequence was the appearance of Smallpox among the second family, of whom three had a severe attack, and a fourth, a young man of 19 or 20, had the disease in a mild form, of which he was not cognisant, and continued his work to the danger of others. A lodger in a good street, also some distance away, contracted the disease, being a frequent visitor to the above No. 2 family. Second case:—Harriett H., a married woman with two children, aged 4 and 6 respectively, occupied a miserable room on the first floor of another house. The mother, was then recovering from Smallpox, her only nurse during the early and acute stage of her illness having been her eldest boy. In a second room on the same floor, lived a young married couple, and on the ground floor, consisting of two rooms and a kitchen, five people lived, and here also Smallpox made its appearance. Visited a third house in the same street, and saw a small room, where four children slept; three were re-vaccinated, and escaped, whilst the fourth, unprotected, was attacked. Several other cases occurred in the same street, and in the others adjoining. W. G., being asked if she could give any information as to the manner in which her children contracted Smallpox, replied that she didn't know, but it was ascertained that she left an infected house, and in all probability carried contagion to her new home,

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where Smallpox subsequently appeared. Of another family, who could give no information, it was found that their children were in the habit of playing with children in another court, who had the disease in a mild form. In another street, the origin seems clearly traceable to its importation in a travelling van used for selling goods, three children had the disease in a very virulent form and died; the remainder of the family then took lodgings in another street, and there, too, Smallpox broke out in the house they removed to, and spread in the immediate neighbourhood. J. J. considered he caught Smallpox from another man, who, from the description given, appears to have returned to his employment before he was free from infection. Before leaving this subject, I may refer to the condition of the houses and streets in which the disease has caused the greatest mortality. As might be expected, it raged with greatest virulence in the houses of the poor, well fitted, by overcrowding, imperfect ventilation, and neglect of sanitary precautions, as well as by the neglect of vaccination and re-vaccination, to lay the foundation for the introduction of epidemic diseases, and for their diffusion when once they have arisen. In the houses above mentioned—at least, the few in which I inspected the condition of the cisterns, and water closets—I found the former as a rule uncovered, thereby rendering the water they contained impure, and the latter in a highly dangerous state from a deficient supply of water, and neglect, probably on the part of the householders, who generally disregard all efforts at cleanliness.

It has been often stated, that the present epidemic is not remarkable for having peculiar dens, the disease being more scattered over the poorer streets, and often breaking out in the houses of the rich, far removed, as is supposed,

from any contagious influence. This, indeed, has been the case; but when we come to make strict inquiries, and carefully analyze the evidence, we find the disease is chiefly confined to the domestic servants, who, in many cases, contract it whilst visiting their friends, who, as a rule, inhabit the narrow, wretched streets so numerous throughout London. Several instances can be adduced, affording satisfactory proof that in many cases the disease is so contracted. When asked any question as to the manner in which they caught the disease, the reply is, that they have been nowhere, or that they caught it in church, or that it arose from a cold. There is probably some restraint placed on them by their employers, and so they learn to conceal everything calculated to throw a light on this matter.

Thus it is, in my opinion, that many cases arise, for which it is supposed that no cause can be traced. It cannot, however, be denied that a great number still remain unaccounted for. How many cases may arise in our large Hospitals and Infirmaries, where one may see, occasionally, a Patient suffering from Smallpox or Scarlet Fever waiting, with a number of others in the out-patient department, for medical advice, it is impossible to say; and considering the perfect freedom of communication that takes place, whether in travelling, or in our daily intercourse in the world, it does not appear a matter of surprise that such should be the case.

In conclusion, I must say that I am deeply impressed with the advantages I have enjoyed of studying the various forms of the disease which have come under my care during the year I have held the appointment of Medical Officer to

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this Hospital; and I feel mos grateful to the Managers for the encouragement and assistance I have received in carrying out the responsible duties of the office.

I have the honour to remain, Gentlemen,

Your obedient Servant,

C. M'CANN,

Medical Superintendent.

From the Author

REMARKS

ON

LEGISLATIVE MEASURES NOW IN PROGRESS

CONCERNING

DWELLINGS FOR THE LABOURING CLASSES.

BY

H. W. RUMSEY, F.R.C.S.,

Member of the General Medical Council.
Author of "Essays on State Medicine," &c. &c.

(REPRINTED FROM DR. LANKESTER'S "JOURNAL OF SOCIAL SCIENCE," MAY, 1866.)

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DWELLINGS FOR THE LABOURING CLASSES.

All careful inquirers into the condition of workmen and their families, whether in town or country, seem to agree that a thorough reform in their dwellings is one of the most pressing wants of the age. We hear a great deal about the progress of civilisation, but (as was truly said by a Poor Law Guardian at a recent meeting of the Society of Arts), "civilisation, in the highest sense of the word, appears to be retrograding as regards the home accommodation of the working classes." It is now generally admitted, that no very extensive change in this respect, no change at all adequate to the necessities of the case, can be effected without some sort of help from the Legislature; help which may have to be afforded in several directions, and by several methods.

The most zealous worshippers of that political idol—*Laissez-faire*—are obliged to confess, that in this matter voluntary effort has been fairly tried, and has failed to provide for more than a small fraction of the great emergency; although the experiments which have been made are rendering important service to the good cause, by showing more clearly what to aim at, and what to avoid, in future undertakings.

Several projects for improving and building homes for the working classes are now before the public, and three or four are under the consideration of Parliament. Some are merely palliative, though useful, measures; such as plans for purchasing ruinous, foul, and crowded dwellings, in order to alter and adapt them for decent occupants. These efforts, it appears, will be aided by the Treasury Bill, brought in by Mr. Childers, and I need not advert again to them.

In the following remarks I shall avoid all reference to financial considerations, my object being to call attention to the main requisites of a real, permanent, and general reformation in the housing of the poor; namely (1), the destruction of those wretched dwellings which are incurable nests of disease and

crime; and (2) the erection, on proper sites, of well-planned and healthy houses, sufficient in number and accommodation, not only for the dislodged masses, but also for the large additions continually making to our town populations. These two requirements are, or ought to be, inseparable parts of one measure. The former has already been tried without the latter, not indeed tentatively for the benefit of the miserable inmates of condemned dwellings, but simply in the cold-blooded economy of speculation, as a first step to the extension of railways, docks, commercial structures, and public improvements, in the metropolis and other populous towns.

It is almost needless to repeat, what has been so often stated on unquestionable authority, that the overcrowding, the social degradation, the physical sufferings, and the mortality of the poor have been fearfully aggravated by these structural changes. I proceed at once, therefore, to notice some characteristics of the various plans which have been lately proposed, observing, *in limine*, that the promoters of each scheme demand a distinct and special machinery, that each party proceeds without regard to the views of the others, and that each seems to have some points of conflict with the rest.

1. There are those who wish Parliament to aid the efforts of working men, members of freehold land societies or building societies, to supply themselves with houses, by extending the legal powers of those societies, under the control of municipal or local authorities. Mr. Beggs represents this party. From extensive observation, he is convinced that there is a very large class which, by the aid of railways, could and gladly would escape from the densely-crowded centres of population to suburban districts, if the societies to which these men belong were empowered to purchase land within a certain distance for building purposes.

2. There are those, represented by Lord Carnarvon and Mr. Hughes, who ask Parliament to compel railway companies and other associations for commercial enterprise or public benefit to provide suitable house accommodation, within accessible distances, for the working people evicted by those companies or bodies in their preliminary demolitions.

3. There are others, represented by Mr. Torrens, who ask Parliament to impose on municipal, parochial, and other local authorities the obligation of purchasing and pulling down streets, alleys, and houses, unfit for human habitation, and of erecting "permanent and healthful houses suitable for the accommodation of persons subsisting by daily or weekly wages" (clause 5); the cost of these improvements to be defrayed by advances from the Public Works Loan Commissioners, on

security of the local rates, and to be repaid by annual instalments in thirty years.

4. Again, the Government proposes to extend the powers granted by the "Labouring Classes Lodging-houses Act of 1851;" also by enabling the Public Works Loan Commissioners to make advances to local authorities, commissioners, companies, and employers, for the purchase of land and the erection of labourers' dwellings; and by empowering such persons and authorities to accomplish their object by a variety of existing legal provisions. The period of loan is to be extended to forty years.

Thus we find that these several reformers contemplate at least four different kinds of agency; the workmen themselves in building societies, railway and other companies, local authorities, and capitalists or employers—both the Government and Mr. Torrens proposing that the undertakings should be aided by national loans.

I. While, to a certain extent, we may reasonably support all these demands for legislative aid, and while we hail the employment of many means towards so good an end, we are justified in calling for a preliminary inquiry respecting the PLACES in which it is proposed to erect new dwellings.

Mr. Torrens would confine the artisans and their families to the already crowded areas of town jurisdictions.

Mr. Hughes and Mr. Beggs would enable them to settle, if they preferred it, in the more airy and thinly populated suburbs.

The Government leaves open the question of site, although the title of their measure indicates "populous places."

Now, before any Bill is passed which determines the localisation of new dwellings, it is of the greatest moment that this question should be thoroughly considered, lest a new source of evils and another class of abuses be legally and permanently established.

Whether the proposed sites be in or out of towns, or by whatever persons or authorities they may be chosen, if they are radically and incurably bad—owing, for instance, to natural malaria, lowness of level, or dampness of soil—the social and sanitary objects of the improved dwellings will be defeated.

Again, if, in addition to natural defects of site, there is excessive density of population; if crowded and unhealthy dwellings in the centre of a populous city are to be swept away, only to make room for houses of a better sort *on the same sites*—houses in which an equal, or perhaps a greater, number of human beings are to be massed on improved principles, the ultimate failure of the plan, as regards its highest purposes, will be still more certain.

I am not now about to dilate upon the effects of mere density of population, or to prove its connexion with sickness, mortality, pauperism, turbulence, drunkenness, and crime of all sorts. The statistics of this question, though very imperfect, and liable at present to error, show, *primâ facie*, that moral and physical evil does almost invariably accompany the undue aggregation of inhabitants upon a limited area; and this, independently of the overcrowding of persons in single rooms or houses.

It is remarkable that even many sanitary reformers, not to say the uninstructed public, are very unwilling to admit mere density of population as a main cause of disease, &c.* One of the ablest of the metropolitan officers of health seems to be so oblivious of the physiological effects of condensing the population, that he proposes, "without adding to the area of the metropolis, to provide healthy house accommodation for another million of inhabitants." In other words, he would diminish the average supply of oxygen to each inhabitant by twenty-five per cent. A certain amount of atmospheric air we all know to be indispensable to healthy existence. If the air over a given surface be shared by too many breathers, there is, of course, too little oxygen supplied for the maintenance of the life of each. Moreover, air which has been in contact with effete or decomposing organic matter, is found to have lost its oxidising property. The oxygen itself becomes inert, ozone disappears—as experiments by Dr. Richardson and others have abundantly proved. The practical application of this scientific discovery to the subject in hand is obvious enough.

In enactments for the building or rebuilding of houses for the working classes, security should be taken by Parliament not only that marshy ground, bad soils, and low levels shall be avoided, as far as possible, but also, that in places wherein the number of persons housed upon a certain surface of land shall be shown to be decidedly in excess of a safe maximum—where, in other words, there are too many inhabitants to an acre—the density of population shall be reduced, and the number of residents in any new dwellings restricted, under well-considered regulations.†

* In some recently published comments, very ably written, on mortality from typhus in Liverpool, the author confesses his astonishment, that notwithstanding all the sanitary improvements in that great town, its vast enterprises for sewerage and water-supply, its hygienic inspection and purification, and its many natural advantages, it still ranks the highest of all towns in the kingdom as to rate of mortality. Casting about for some explanation of this bad pre-eminence, he overlooks the fact which stares him in the face, namely, that Liverpool displays by far the greatest density of population of any provincial town in England. This density seems, then, to be as clearly a cause of the high rate of mortality, as overcrowding is acknowledged to be the specific cause of typhus.

† "The maximum density should be fixed by law at 50,000 persons to the square mile, or 80 to the acre."—*Health and Sickness of Town Populations*, 1846, p. 9. "Chaque habitant doit jouir au moins de 40 mètres carrés de terrain" (that is, 48 square yards, or 100 persons to the acre).—Michel Levy. *Hygiène Publique*, vol. ii. p. 572. 1850.

All future building projects ought to be controlled on the principle of dispersing overcrowded populations and enlarging areas of habitation. The greater speed and more abundant facilities of locomotion afforded by the railway system would amply justify the Legislature in enforcing that principle, which need involve neither inconvenience nor loss to employers or workmen. Yet, if the measure proposed by Mr. Torrens is to be carried into effect in its present form, if the ground to be cleared under the provisions of his Bill is to be again occupied by large blocks of model lodging-houses, one of the chief causes of physical and moral degeneracy will remain in full force.

"The piling up of living animals, layer upon layer—as men, women, and children are piled up in the numerous flats of these lofty buildings—cannot materially alter their noxious influence, as breathers and exhalers, on the atmosphere above a given surface of ground. The horizontal movements of air, the high winds, which act so freely and beneficially in country districts, and which, to some extent, diminish the bad effects of town aggregation, are checked by the height and magnitude of the blocks. And even if the circulation of the air be not wholly obstructed, yet if numbers of such enormous structures are to be built in close proximity, as some of their defenders propose, the air blown into any block must have been previously vitiated by passing its neighbours. The multiplication of these family barracks, so as vastly to increase the already excessive density of population, is surely a very alarming prospect, socially and physically, for the inhabitants of the metropolis.

"I do not admit the validity of any statistics—*e.g.*, of death-rates and sickness returns relating to these 'model dwellings.' For some time after they are opened, their inmates are sure to be the best, physically and morally, of the working classes. The most thrifty, decent, and industrious, and therefore the most healthy, are the first to secure the advantages of clean and civilised apartments. To infer, from a relatively low ratio of deaths, &c., for a short period of time, that this principle of housing is the best that could be adopted, would be certainly to jump at a most ill-founded and illogical conclusion."*

The obvious conclusion from these and many other facts† and arguments seems to be, that in providing for a better distribution of the masses, as large a proportion of the working people as can

* Extract from my letter to the President of the Metropolitan Association of Health Officers, *Journal of Social Science*, March, 1866, p. 277.

† An example of the benefit resulting from a reduction of the ratio of density is shown in Dr. Letheby's Reports on the City of London, where, in the last ten years, the population has declined from 129,922 to 114,472, and the inhabited houses from 14,706 to 13,478, and at the same time the average rate of mortality from 23.8 to 23.3 per 1000.

conveniently live out of town should be properly housed in suburban districts.

Objections have been raised to this extradition of overcrowded populations, but none, in my opinion, that may not be easily disposed of. To some of them I would now briefly reply.

1st Objection. "Workmen ought not to be removed from the elevating and civilising influences of town life."

What these influences are may be best known by a close inspection of the localities in which the labourers now live, and the public-houses to which they resort after work-hours. Mr. Beggs very fairly ridicules the notion that he was proposing "to convert men into savages, by inducing them to leave the busy and thriving localities of Whitechapel and Bethnal Green, with all the beneficent influences which abound in those regions."* He shows that by the purchase of estates and their division into allotments, already effected on the Great Eastern and other lines of railway, facilities are given to the denizens of towns to get out into districts where all the more desirable elements of civilisation are amply provided. There are few well-ordered suburban villages in England without the church and the chapel, the school and the working man's club and the cottage garden. The admirable results of the separate cottage abode as compared with the town barracks are most convincingly shown in the recently published work, "Le Travail," by M. Jules Simon. The settlement of Mulhouse, in France, is perhaps the most decisive experiment that has yet been made, and it may serve to silence this class of objectors.

2. "It is inconvenient and costly to the workman to reside at some miles distance from the work-place or labour-market."

This objection has already been met to some extent, and may be more completely removed, by the extension of railways into towns, and by the cheap workmen's trains which carry the labourer six or eight miles towards his place of work, in the same time that he would formerly have spent in walking one mile. It is not the actual distance but the time spent in traversing it, that justifies the objection; and this time may be still further shortened.

It was a mistake, and a perverse one, to represent settlements in the outskirts of towns, as necessarily increasing the cost of labour, and inflicting loss and inconvenience on the working classes,—as though it were proposed to drive them out of town by compulsory legislation. The success of experiments already made (under all the disadvantages arising from the present state of the law on the subject), and the evident feasibility of more

* *Social Science Review*, March, 1866, p. 206.

extensive undertakings of the same kind, entitle the project to candid, and indeed to favourable treatment.

It is true that railways do not yet meet all the requirements of a large system of suburban residence; it is also true that many of the older railways have hitherto made no adequate provision for workmen, still less for their dwellings. But it must be remembered that the proposed villages cannot come suddenly into existence; and that while they are forming, railway companies would have time and opportunity to complete their lines, and to make other necessary arrangements for the convenience of the classes to be assisted. As regards railway accommodation for working men, we must be satisfied for the present with the action taken by the Government.

If the proposals of Mr. Hughes went too far, by creating a new sort of tenant-right, they were nevertheless based on a most equitable and reasonable principle—namely, that companies, persons, and corporations, who destroy the dwellings of the poor *intra limites*, should be compelled to provide them with improved dwellings *extra limites*.

This principle has been supported by the Society of Arts,* and acknowledged by some of our ablest statesmen.

It appears that, as far as London is concerned, no future railway bill is to pass without provision for the penny train at suitable hours. Competition may probably secure the co-operation of the established lines; but in time, recusant companies ought to be compelled to provide conveyance at convenient hours and prices; and all should be empowered to obtain land, on which to build labourers' dwellings near their stations, and within convenient distances from towns.

3. "Workmen like to dine with their families." This objection must have been made by some theorist, ignorant of the fact, that at present comparatively few workmen think of dining with their families. Neither the provision nor the cooking of food in the houses and lodgings of the poor are such as to induce the man to attempt to "dine with his family."

But the metropolis and other first-class towns now supply to the labourer and artizan a means of feeding at mid-day, which is incomparably more attractive and more wholesome.

Common dining-halls, such as those in Fleet-street, and the superior establishments of the kind in Glasgow and Birmingham, provide workmen with better food, at once more econo-

* See the admirable Report of their Committee (*Journal of the Society of Arts*, May 12th, 1865). The workmen's trains of the Metropolitan Railway are, it is said, a marked success; and we are told that, on the London, Chatham and Dover lines, "the number of workmen carried by these trains has increased week by week."

mically and more comfortably, than the majority can possibly command at their own houses.

Again, those more frugal and respectable labourers who can manage to provide home comforts in a better dwelling, will enjoy them all the more, after work done, at even-tide, in a pure air and quiet neighbourhood.

4. "The workmen themselves have objected to suburban sites on railways."

Admitting this to be true in the case of a body of men employed to support some metropolitan scheme, it is sufficient to reply, that another and a larger body have practically pronounced in favour of extra-municipal accommodation, by renting cottages out of town, and using the penny train. The number of this class is on the increase.

Doubtless there are many working men, without information as to the physiological effects of crowding, strongly biassed by habits and associations, and incompetent, in this matter, to judge of their own best interests, and these may for the present prefer lodgings in metropolitan blocks. As education extends among this class, and as the good effects of a better mode of habitation become more widely known, their objections will cease, and they will follow the growing exodus.

This is a matter on which the Legislature ought not to be influenced by resolutions adopted by clubs and committees held at the public-houses of the metropolis.

A certain proportion of workmen, I grant, must always live in the midst of a crowd—among factories, docks, and warehouses—although this proportion is probably not so large as has been represented. A limited number of town blocks should, no doubt, be provided; "but the size, height, and human contents of these blocks should be under certain restrictions, and especially they should not be built near together, or in rows or streets."

II. I am thus led to a second point demanding attention, before any building project is sanctioned by Parliament: I mean the necessity of more stringent regulations as to the plans, materials, and construction of labourers' dwellings.*

No one who travels through the outskirts of London and other large towns, can fail to be struck with the wretched appearance of the badly-built cottages and rows of mere huts, which are springing up like mushrooms in all directions.

Here it is that building speculators of the lowest order, and hordes of wanderers, who escape from populous places for want of room, and from country parishes for want of remunerative employment, combine to make the border territory between town

* See Essays on State Medicine, pp. 16, 17.

and country the worst regulated, and in some respects the most dangerous, of all districts. Again, the atrociously bad condition of the cottages of rural labourers in most country districts, is well known to those who visit them, officially or voluntarily; and it has been thoroughly and faithfully exposed in the Seventh Report of the Medical Officer of the Privy Council.

I would, therefore, urge the importance of extending a well-considered code of building regulations to the whole of Great Britain. Granting that the several requirements and conditions of building must vary considerably in dense and sparse populations, and in different parts of the country, according to climate, soil, and materials, &c.; granting also that the same details of regulation would be inapplicable both to the town lodging-house and to the rural cottage; there, nevertheless, seems to be no reason whatever why some department of Government competent to deal with the question, should not be authorised to draw up provisions suited to various localities, and made imperative upon the governing bodies of towns, districts, or counties.

A general Building Act is an essential—I may say an indispensable—accompaniment to any Act for promoting better dwellings for the working classes.

The sites of condemned houses, when cleared, should either be resold under stringent conditions as to the sanitary construction of the houses to be built on them and the number of persons to be accommodated, or be thrown open to the public and planted for recreation grounds. Every possible inducement consistent with sound policy should, I repeat, be offered to local authorities, to companies, capitalists, and employers of labour, and to the workmen themselves, to extend the present too limited areas of towns.

Here I would observe, in passing, that the present irrational restriction of certain political privileges to those who reside within the boundaries of boroughs, operates powerfully in promoting an injurious aggregation of inhabitants—injurious not only to health and morals, but also to the pecuniary interests of the working classes, by raising extravagantly the rental of ill-conditioned house property.

The builders of suburban cottages, whoever they may be, should be required to report all particulars as to site, plans, building materials, water-supply, drainage, number of persons to be housed, &c. These reports should be made to competent authorities, empowered to disallow the erection of unhealthy dwellings, as well as to register and inspect, from time to time, such as may be built. Both proprietors and tenants should be subject to civic regulations, and to right of entry by official visitors.

III. Such considerations carry us on to the question of jurisdiction; and here I regret that I cannot avoid criticising the main features of the Bill proposed by Mr. Torrens.

His measure would apply only to towns and parishes in which there is a Board of some sort for local sanitary management. All building or rebuilding is to be done *within* the limits of the local jurisdiction. It is obviously intended that the new dwellings shall be erected on the very spot, "on the same or some adjacent site." (Cl. 7.) However vile that site may be, however unfit for human habitation, it *must* be used for the new dwellings. Nay, worse, the number of persons to be accommodated must be "not less than that of the persons and families previously residing in the houses which shall have been previously removed." (Cl. 7.)

Thus, the social and sanitary evils, caused by too great density of population, are *not* to be diminished, but they are to be maintained by law; and they may be augmented indefinitely, for the Bill specifies no limit to the numbers who may be housed on the "site."

The propriety of some such limitation becomes more apparent when we learn that, whereas in the very worst parts of Liverpool in 1843 the amount of superficial space to each inhabitant was at least 4 square yards, the Metropolitan Association for Improving the Dwellings of the Labouring Classes in 1857, allowed only 4½ square yards (including open spaces) to each resident.

It is gratifying to find that Mr. Peabody's trustees have improved upon the earlier effort. At Spitalfields and Islington, the dwellings and open spaces afford an average of eight square yards to each occupant. Let us hope that this small allowance may be at least doubled, by reducing the number of floors, in future buildings.

Every practical man will at once perceive that the provisions in Clause 8, for "a window in each room being made capable of opening to the outer air," and for a space of 350 cubic feet being afforded to each occupant, would not infallibly secure the intended sanitary advantages. No limit is prescribed either to the height or to the proximity of the new buildings. The Bill provides no effective remedy for some of the most flagrant wrongs in the housing of the poor.

No provision is made for the purchase of land and the erection of houses beyond the limits of the local jurisdiction, and therefore no opportunity is afforded for a safe and salutary dispersion of the too crowded masses.

The whole direction of the proposed measure is committed to Boards, which have not hitherto shown any particular qualification for the office, any strong desire to promote the physical and moral welfare of the working classes, or any remarkable skill in

the sanitary government of their districts. It has been truly said, that "the worst sort of houses in towns generally belong to the class of persons which wields a preponderating share of local authority."

Surely it deserves consideration whether the administration of such an Act might not be committed to bodies having more extensive areas of jurisdiction, and containing a larger proportion of well-informed members, unfettered by local prejudices and interests. In the provinces, Boards of Guardians would be preferable authorities. Their districts are generally much larger than those of town councils and parochial Boards. They contain justices of the peace as *ex-officio* members; they include under their management every parish in the kingdom.

Better still, in some respects, might be the county magistrates acting in quarter sessions, especially if aided by representatives from local Boards.

Either the district or the county authority, or both, might be empowered, and in extreme cases directed, to purchase or take land for building sites, *on the requisition of any local Board or of the central authority*,—such requisition setting forth the necessity for extra-municipal or extra-parochial dwellings for the overcrowded residents within the narrow limits of local government. The provisions of both Bills now before Parliament might be extended to the authorities of wider jurisdictions.

No measure would be complete unless it included compulsory powers to purchase suitable sites; nor has any valid reason ever been assigned why powers granted to railway companies should not be shared to the fullest extent by those whom the Legislature authorises or enables to build dwellings for the poor.

IV. Lastly, I would suggest further consideration of the question, what particular department of Government might be most properly empowered to initiate and control proceedings under the proposed Act.* Mr. Childers' measure authorizes the Commissioners of Her Majesty's Treasury to issue instructions, not only as to the grant of loans and the execution of works, but also as to "the class of houses or dwellings for the building of which such loans may be made, and the suitableness thereof to the purposes intended, and as to the means that are to be provided for their maintenance, repair, and insurance."

Mr. Torrens would commit all or most of these functions to

* "For this purpose there is wanted a new ministerial department, which shall stand in the same relation to Town Councils and Local Boards of Health as the Poor Law Board does to the Guardians of each union. To this body should be attached a proper staff of inspectors, who would be empowered to hold inquiries into cases of alleged neglect on the part of any local authority, and to report on them to the Central Board."—*Saturday Review*, March 31, 1866, page 393.

the Home Secretary. One is at a loss to perceive why this special subject should be cast upon a department of Government which is said, by those whose position and experience entitle them to give an opinion, to be already over-burdened with the variety and magnitude of its affairs.

But looking at the sanitary objects of the proposed dwellings, it might be reasonably inferred that a Committee of Privy Council on Public Health, to be aided by the advice and experience of the Medical Officer of that Council, might be more appropriately empowered by Parliament to carry into effect a general measure for the better house-accommodation of the working classes.

NOTES

ON

SANITARY REFORM:

THE HEALTH OF TOWNS.

BY

A MEMBER OF THE ASSOCIATION FOR THE PROMOTION OF SOCIAL SCIENCE.

"LIFE IS A HOLY THING."

LONDON:
J. AND A. CHURCHILL, NEW BURLINGTON STREET.
1872.

In a Paper, "On the Physical Degeneration of Town Population," read before the Association for the Promotion of Social Science by John Beddoe, B.A., M.D., &c., in the year 1861, it was observed: "It appears "that we, who, down almost to the beginning of "this century, were as compared with the Germans, "Hollanders, French, and Italians, characteristically "a race of villagers and country people, are rapidly "becoming concentrated into urban communities." After tracing the causes of the deterioration superinduced by this national change of life and circumstances, the remark is added, "No better example "could be pointed out of the effects of almost all "these causes combined than the puny and unhealthy "offspring of many of our excavators, that stalwart "class of men whose size and physical power have "been the astonishment of the labourers of many "another country."

Ten years later the same gentleman, in a work "On the Stature and Bulk of Man in the British Isles," published in the present year, writes: "There "can hardly, I think, be any question of the great "national importance of the whole subject at a time "when, with an increasingly-felt necessity for keeping "up our military power, we have an increasing diffi- "culty in obtaining recruits; and when the truth "that both the individual and the national body

"require physical as well as mental and moral culti-
"vation and development, is becoming more and more
"distinctly acknowledged. When we as a nation fall
"below others in this respect we shall suffer for it, not
"merely in our military but in our commercial, and
"even in our scientific position." Late events have imparted much serious significance to these opinions, and it is not too much to affirm that the question of the Public Health underlies all national interests as well as social questions of the present day.

Much valuable information and counsel on the subject, furnished by the authorities of the time, is stored up in the several volumes of the *Transactions* published by the Association, or is to be gathered from the Parliamentary Blue Books. The object of this brief compilation from those sources is simply to call attention to what has been done in the way of Sanitary adminstration during the last twelve years, and to the very great defects which still call loudly for national attention and reform.

S. SNEADE BROWN.

Pembroke Road, Clifton,
Bristol, August, 1870.

POSTSCRIPT.

Two years have passed since these pages were compiled, and during that period the causes affecting the National Health have risen in their intensity and significance. Small-pox, "which for eight consecutive years "in the Grand Duchy of Baden, and for thirteen "consecutive years in the city of Copenhagen, took "away not one single life," has killed its thousands within this period in London alone. Typhoid and diarrhœa, strictly "preventable diseases," have visited widely our towns and villages, and the heart of the nation has been stirred by an illness similar in its causes to the fatal one which placed it in mourning ten years ago.*

Meanwhile, the warnings of the chief medical adviser in the Public Health Department, on the largeness of this continuing waste of human life, have lately been repeated as follows:—"It seems certain that the "deaths which occur in this country are fully a third "more numerous than they would be if our existing "knowledge of the chief causes of disease were reason-"ably well applied throughout the country; that of "deaths which in this sense may be called preventable, "the average yearly number in England and Wales is "now about 120,000; and that of the 120,000 cases of "preventable suffering which thus in every year attain "their final place in the death register, each unit "represents a larger or smaller group of other cases in "which preventable disease, not ending in death, "though often of far-reaching ill-effects on life, has "been suffered. And while these vast quantities of "needless animal suffering, if regarded merely as such,

* *The Prince's Illness: its Lessons.* A Lecture "On the Prevention of Disease," by Balthazar Foster, M.D. Churchills, 1872.

"would be matter for indignant human protest, it "further has to be remembered, as of legislative con- "cern, that the physical strength of a people is an "essential and main factor of national prosperity; that "disease, so far as it affects the workers of the popula- "tion, is in direct antagonism to industry; and that "disease which affects the growing and reproductive "parts of a population must also in part be regarded "as tending to deterioration of the race.

"Then there is the fact that this terrible continuing "tax on human life and welfare falls with immense "over-proportion upon the most helpless classes of the "community: upon the poor, the ignorant, the sub- "ordinate, the immature; upon classes, which in great "part through want of knowledge, and in great part "because of their dependent position, cannot effectually "remonstrate for themselves against the miseries thus "brought upon them, and have in this circumstance "the strongest of all claims on a Legislature which "can justly measure, and can abate, their sufferings.

"There are also some indirect relations of the "subject which seem to me scarcely less important "than the direct. For, where that grievous excess of "physical suffering is bred, large parts of the same "soil yield, side by side with it, equal evils of another "kind; and, in some of the largest regions of insani- "tary influence, civilization and morals suffer almost "equally with health. Throughout the large area to "which these observations apply, education is little "likely to penetrate unless with amended sanitary "law, nor human life to be morally raised while physi- "cally it is so degraded and squandered.*

"S. SNEADE BROWN.

"London, April, 1872."

* *Thirteenth Report on Public Health for* 1870.

NOTES ON SANITARY REFORM.

I.

THE HEALTH OF TOWNS.

"The great increase of population in England, in the ten years "after 1841, was found, in 1851, to be lodged in the towns. "The population of the large towns was 6,838,000 in 1841, and "8,247,000 in 1851. The question of the health of towns is, "therefore, a question of the strength of England." This is one of the weighty admonitions which issues from time to time from the office of the Registrar-General. The changes are, indeed, great, that have been going on before our eyes for the last thirty years, and in nothing greater than in the mutations of the population, and their influx into the towns. In 1861, according to the same authority, the number of persons living in populous towns amounted to 10,930,811, and those in small towns and country districts to 9,134,386. While, in the ten years, from 1851 to 1861, small towns and country districts increased at the rate of only 3·9 per cent., over-populous cities added nearly 17 to every 100 of the population. "At the commencement of "this century there was not beyond the metropolis a single "town in England of 100,000 people, and only 5 exceeded "50,000; at the present time upwards of 30 exceed that "number."—(*Eighth Report on Public Health*, p. 56.) One chief cause of this mighty movement may, no doubt, be found in the demand for town labour, the aggregation of dense masses brought together by the rapid growth of manufacturing, mining, and commercial industry in particular localities, and the stir of mind and facility of locomotion produced by the railways; but

it has been aided not a little by the slow, steady, resistless operation of other causes, such as the change in agriculture, and the consequent diminution in agricultural holdings, rendering fewer hands necessary, and the strong motives to their further reduction, supplied to the employers of labour by the Poor-Law Assessment prior to the late Union Chargeability Act.*

Whatever may be the causes assigned, the fact of the rapid increase of the town population is indisputable. Meanwhile, the towns, wholly unprepared to receive these vast accessions, have crowded them down on the old population, or found unhealthy quarters for them in those room tenements which have been described so fully and painfully in the *Eighth Report of the Medical Officers of the Privy Council*, "On the Housing of the Poor in Towns," by Dr. Hunter.† The consequences of this state of things have been forcibly set forth in a Paper in the *Social Science Transactions* of 1866, by T. E. Morgan, M.D., "On the Deterioration of Race in Great Cities."‡ He has shown that the sources from which the cities are recruited are the natives of the healthiest divisions of the English counties, who may be regarded in the mass as picked lives; that the counties which fostered them in their youth receive no equivalent for this constant drain, and are diminished in their strength in proportion, and that the stream of yearly immigration into London in particular is so large as to justify the assumption that it contributes in no small degree to maintain that favourable standard of health which has long characterised the metropolitan returns.§ The causes and progress of the physical deterioration of the masses thus received into the towns, and the extent to

* For the process of this change, and the description of the exclusiveness of the close villages, and the overcrowding and sanitary horrors of the open villages for those who remain, see Dr. Hunter's Report "On the Dwellings of Rural Labourers," *Seventh Report Public Health*. "Migration to the Towns, or rather, expulsion from the Villages, set in in 1837."—*Ibid.*, p. 230.

† See Appendix No. 1.

‡ See also a Paper "On the Physical Degeneration of Town Population," by John Beddoe, M.D., *Transactions* of 1861.

§ In the Supplement, *Twenty-fifth Report*, the Registrar-General, p. 25, makes the same remark.

which those influences are undermining the vitality of the nation, are entered upon at length in that paper, which was based upon a large experience, gathered from the disease returns of one of the largest centres of our population. It concludes with valuable suggestions relating to street ventilation, isolation of the first cases of epidemic infection, inquiries into returns of disease as supplementary to, and of equal importance with the registration of deaths, and other matters of sanitary prevention which, from the want of an efficient sanitary staff in the towns, are usually neglected. With the country thus giving up its best blood to the towns, and the towns quickly corrupting and consuming it, what can follow but an ultimate deterioration of the population? Already the sanitary and moral conditions of the towns, which are yearly adding thousands upon thousands to their teeming numbers, are becoming a subject of anxious and even fearful contemplation to those who know from past experience how closely these conditions are combined in a mutual relation of cause and effect. Meanwhile, Divine Providence vindicates the violation of its own natural laws by special visitations. "All "analogy," says Dr. Farr, "proves that no extensive or perma-"nent degeneration of a race can be accomplished in less than "two or three generations. The great change is as slow and "insidious as it is certain. It is rarely perceived by its victims, "who remain rooted and benumbed on the spot, unless they and "the community are aroused by sudden and terrific catastrophes. "Wherever the human race, yielding to ignorance, indolence, or "accident, is in such a situation as to be liable to lose its "strength, courage, and lofty emotions, the plague, fever, or "cholera comes, not committing havoc perpetually, but turning "men to destruction, and then suddenly ceasing that they may "consider."—(*Cholera Report of* 1852.)*

With this handwriting, "Deterioration of Race," shining on the wall of the not distant future, the health of towns becomes a matter rising above the sphere of local administration, and enters into the province of imperial care and control. Unfor-

* See *Essays on State Medicine*, by H. W. Rumsey, M.D., 1856, p. 125.

tunately, the mind of the country does not appear to have yet apprehended the full dimensions of the danger. Sanitary legislation, hitherto, has been chiefly permissive; that is to say, it permits local authorities to act or not to act as they please, and its execution is entrusted to those who, from a variety of motives, are too often more active in opposition than in action. Towns should not be permitted to deal as they please with the health and lives of their inhabitants. The health of the nation is a God-given trust, and the charge should be sacredly observed by the country at large. Formerly, there may have been some excuse for our inattention. Now, potent agencies, once occult, have been exposed to the view of medical science, and a formidable number of diseases, all impoverishing the blood and reducing the strength of multitudes, is annually traced home to impure water, bad drainage, and foul air. In short, man may almost be said to hold in his own hands the means of prevention and safety; but, without the direct and active interest of the Government, the gift which this knowledge confers is nearly useless to the community, to that large portion of it, at least, who cannot help themselves. It has been well observed, "No medical "man can have paid attention to the sanitary condition of the "dwellings of the poor, without knowing that upon various "sanitary circumstances their length of life and power of "bringing up children depend. There is nothing more certain "in medical knowledge than that. The ratepayers who will "not have their places in a good sanitary state pay for this "disease and premature loss of life. Society at large pays for "a greater amount of pauperism and ill-health, and the interest "of every individual in the community is bound up with the "welfare of the poorest. There are some things which men "ought to do for themselves; they ought to be industrious and "be good citizens personally; but there are other things which "individuals, especially those who live from hand to mouth by "their daily labour, cannot by any possibility do for themselves, "and which can only be done by the community in some form; "and it is simply a want of political wisdom which hinders "Government from taking a truly liberal view of their liabilities

"in that direction. It is all but impossible for the poor, who "live by daily labour, to effect the combinations which alone "can produce a sound sanitary condition of the people."—(H. W. Acland, M.D., F.R.S., *Minutes of Evidence*, 1865.) How those liabilities had been discharged hitherto is best learnt from another competent authority. "The state of matters," says Dr. A. P. Stewart, in 1867,* "is in some parts of the country "almost incredible. After eighteen years of legislation in these "matters, we are, as regards the greater portion of the country, "nearly without any sanitary organization whatever. The plan "the Government have hitherto adopted is this: to make laws, "and to throw them out on the country, saying, 'There they "'are; obey them or not, as you please; we will not trouble "'ourselves to inquire whether you do or not.' This is precisely "what is being done now. They have passed laws, in many "respects admirable, and said it would be a proper and right "thing to obey them; but they have never inquired for eighteen "long years whether they were obeyed or no. In some few "instances, you will find information in Blue Books of very "great interest; but if you want to know how the Public "Health Act and the Nuisances Removal Act, and others of "the kind, are being actually obeyed through the country, you "have no means of ascertaining these matters."

* Discussion of the British Medical Association at Dublin, 1867.

II.

THE HEALTH OF TOWNS.

Dr. Farr, in his report of 1852, represents the cholera as a visitation sent to warn mankind against the ever active causes tending to deterioration of their race, and to lead them to consider. Since that year, more than one-half of the life-time of one out of the three generations, the term assigned by the writer for the accomplishment of the physical decline of a nation, has passed away, and there have been in that interval two more visitations. Have their teachings yet led us to consider? The annual loss of more than a fourth of the total number of 500,000 on the bills of mortality, from causes which medical science and common experience have shown to be preventable, and the yearly recurring destruction of 20,000 of that number, and the grievous sickness and endangerment of life, perhaps of twenty times that number (9th vol. *Public Health*, p. 33; also 10th vol., p. 9) from diseases of which excremental poisoning of atmosphere and drinking water has been pronounced to be the specific cause of their diffusion, is the only answer that can be returned to the inquiry.*

This is a melancholy retrospect for the great and pressing cause of Sanitary Reform. What has legislation done in the interval?

"Our sanitary legislation," says Dr. Lankester (Address "On Health," *Social Science Transactions of* 1865), "has been slow, and its action has been by fits and "starts, as now and then the public mind has been alarmed, and the legislative "mind has sympathized with it; but we no sooner improve than we go back "again. Our Legislature lacks earnestness. All our Acts are so constituted that "they may be defied with impunity. They give the power of action to those "who are either interested in maintaining sanitary abuse, or are ignorant of the "dangers which arise from their toleration. If they could be made to see that "disease and death are the most costly luxuries in which man can indulge, they "would give more scope to the action of their medical officers of health."

An active motive power, adequate to the wants of the age, and fitted to cope with its retro-active tendencies, appears to be somewhere wanting. Her Majesty's Privy Council, by means

* See Appendix No. 2.

of the high medical ability at their command, have accumulated valuable stores of information on the causes and characteristics of the diseases which affect the public health, and have brought us, it is said, to the eve of great discoveries, in respect to the causation of disease. Any great derangement of the health of the community, and any marked local outbreak of disease, are carefully investigated, and each year adds to the mass of important facts brought together for the information of those who care to profit by them. But the Council only exercise the functions of advising. If recalcitrant communities refuse attention and compliance, their action is stopped at the threshold, except in those great epidemical crises which leave no time for wise prevention. Their chief medical adviser, in expressing his opinion strongly in the year 1858, that it should be made obligatory on the authorities to appoint permanent officers of health, adds:—

"There is a fatal misapprehension in many minds as to the time when epi-"demic disease is present; too commonly it is unknown or forgotten that just "at such a time they are least able to do good. The local conditions which "favour epidemic visitations are conditions which for the most part it takes "time to create, and which it always takes time to remove. The death-rates of "certain ordinary diseases measure these local conditions, and predict where are "the sure places for epidemic mortality to fall. It is in the interval between "epidemic periods that measures may be taken, which, while they reduce these "ordinary death-rates, give security against the dreaded invasions. It is the "ordinary, not the exceptional, health of districts which most calls for sanitary "reform. In the moment of pestilence, little can be done." And, in another part of the same report, he counsels as follows:—"Let local authorities do their "utmost against the daily diseases of their districts—against the small-pox, "against the phthisis, against the special diseases of the operatives, against "the murderous mortality of infants—confident that, in taking this course, they "will be adopting the best precautions against occasional pestilence; and "equally confident that, in abating year by year whatever are the local redund-"ancies of habitual disease, they will be counteracting causes of death infinitely "more powerful than those which, because of their suddenness, seem so terrible "in the moment of epidemic visitation."

Mr. Simon, after commenting on the 50,000 of the adult population who fall victims annually to pulmonary phthisis in England alone, and on the high local mortality of children, both indicating a high local prevalence of those causes which determine a progressive deterioration of race, adds:—"These "questions are not uninteresting to the ratepayers of places

"where high local rates prevail. For sanitary neglect is mis-
"taken parsimony. Fever and cholera are costly items to
"count against filthy residences; nor, probably, will such
"questions appear unimportant to the public economist. For
"the physical strength of a nation is no mean part of its
"prosperity."—(*Report of the General Board of Health*, 1858.)

Local administrative bodies, constituted as they are, seldom anticipate or look beyond the actual emergency. It was with no little surprise that the visitors to Birmingham, at the late Social Science gathering, learnt that that great and important town possessed no medical officer of health to collect and bring into one focus its sanitary statistics; and that, with great natural advantages, it had been living on the reputation of a death-rate, which, when applied to the several component parts of its large population, did not bear the test of examination. A necessity, therefore, presents itself for some more steady, close, continuous, and authoritative direction and supervision of the national health than the existing system admits of. It may be urged that the community is itself able and bound to cope with these evils,—but how? The easy and well-to-do answer, as it has very recently been answered, "By education." Even the medical officer himself seems to favour this notion, when he says in the same report, with reference to the discontinuance of the coercive power of the Public Health Act of 1848, "If it be a "well-founded opinion that I have ventured to express, that the "sanitary progress of localities is almost an educational matter "(wherein enlightenment counts for more than compulsion), "the resignation of that power is no loss to the objects in "view." Yet he deviates from that maxim in recommending the compulsory appointment of health officers, and in a preceding page he depicts places "respecting which it may with "truth be said that vice and ignorance and brutality are "among their active causes of disease. From the first moment "of my personal intimacy with such places till now, my assu-"rance has grown stronger and stronger that it is much more "difficult than the wealthy and powerful can imagine for those "who are born and bred in courts, which are nurseries of

"cholera, typhus, and scrofula, to emerge from their wretched
"childhood otherwise than vicious and ignorant and brutal.
"The same soil nurtures both growths of misery." Who, then, it may be asked, will send down a plummet into these depths? Who will educate sanitarily our educated? Who will instruct our instructors? If instruction fails, will the efforts of the ministers of religion succeed? Hear the answer:—"The vicar "of Brompton," says Mr. George Godwin, F.R.S., "writes to "me what dozens of hard-worked clergymen to whom I have "put the question have replied: 'It is literally impossible for "'the clergy to raise the condition of the population in these "'overcrowded places.'" "I ask," says the Bishop of Ripon, "if all the labour of parochial clergy and city missionaries be "not thrown away upon a population so circumstanced? Does "not the same state of things go on from year to year? Is "there any moral improvement in the mass, so long as the "physical condition is unchanged? I have put the question to "men who have faithfully toiled for years in these dens of "London, and the answer is invariably the same:—'No "'general impression is made.'"*

Towns have yet to learn the lesson read to them by high professional authority, that "hundreds of thousands of houses "are in such a defective sanitary state, that it is impossible for "the inmates to enjoy health. Philanthropy and benevolence "work in vain, surrounded by subsoil and surface filth, and "foul air. Workhouses, hospitals, gaols, reformatories, and "schools perform the task of Sisyphus, until a base of clean-"liness has been established."† And elsewhere we are told, "We fill our gaols with felons, and we have city missions, and "put our trust in education; but the influences of filth are "stronger than the policeman, the schoolmaster, and the "preacher; and we ought, by this time, to have learned that "the very foundation of moral training in a tenement is a pipe "of wholesome water from the top of the house to the bottom."‡

* *Transactions of* 1864, p. 515.
† Robert Rawlinson, C.B., *Transactions of* 1862, p. 603.
‡ *Edinburgh Review*, April, 1850, p. 385.

III.

THE HEALTH OF TOWNS.

The General Board of Health, in the year 1854, reported the deaths from preventable diseases in England and Wales to be upwards of 170,000, of which by far the larger proportion of those who survived their fifth year, perished at the adult period of their life, chiefly from various forms of fever; one effect of this destruction of the heads of families, precisely at the time when they have the greatest number of young children to maintain, being to produce and keep up a state of pauperism. How to deal with this startling fact has become a question of the deepest importance to the country generally, and especially to the metropolis, and the difficulty is enhanced by the circumstance that no assistance towards its solution can be expected from that class of the sufferers who are the first recipients and propagators of the maladies affecting the public health. The Board observes: "In districts which are the seats of the most "devastating diseases, no evidence has yet arisen to warrant "the presumption that the most successful examples will lead to "the spontaneous adoption of combined and efficient measures "of prevention. Experience has shown that it is fallacious to "conclude that all is well when there is no complaint. Among "the population living in the lowest physical degradation, "under circumstances which would be commonly deemed in-"supportable, we have met with scarcely one instance of com-"plaint originating with the sufferers themselves; they are "sunk too low to be conscious of their condition."

Nothing but the compulsory action of some stringent sanitary law, whenever society may awake to the necessity of providing for its own security, will be of avail to reach this, the lowest deep of all; a law so devised as to extend to those who profit by these terrible blots, rather than to the victims of them. Next come the workers for their daily bread, whose ailments

swell the vast amount of the nation's sickness to the extent of one-half of the sickness of the town populations. It has long ago been shown that the existing connection between their medical relief and the Poor-Law administration keeps open a door, through which other relief creeps in, and is continually drawing the labouring classes within the pale of pauperism.—(*Evidence, Medical Poor Relief Inquiry*, 1844.)* The degree of acquaintance with the conditions of the masses possessed by the classes above them, and their consequent ability to deal with these evils, is not favourably described: "The middle class, and "even the local authorities," says the Board, after citing instances drawn from two of our chief towns, "are in general "entirely ignorant of the quarters occupied by the poor. Towns "as well as classes which are acquainted with no other standard "of health than their own, are often no better informed on this "subject than the poorest portion of the population. It is not "from within, but from without, that an approximation has "been obtained to the true condition of the great mass of the "population; and we are warranted by experience in stating "that arrangements for the improvement of the public health "on any other basis than an aggressive one against the physical "causes of disease, will not only prevent the completion of what "has been commenced, but will counteract much of what has "been already effected."

Since 1854 a stride onwards has been taken, and where competent medical officers of health have been appointed on an independent footing, and free from the short-sighted influences of the ratepaying interest, much of this darkness has been dispersed, and the several classes have been led to take a more just view of their mutual dependence and obligations. Where they have not been appointed, or where they are fettered by circumstances, the remark of the general Board will hold good for the present time. The description, in 1867, of the existing state of things, is not encouraging:—

* "Health and Sickness of Town Populations," by H. W. Rumsey, M.D., 1866, p. 30.

"The result, then, of eighteen years of sanitary legislation is, that we have "in the metropolis a large staff of able and active, but underpaid, officers of "health, whose recommendations may be adopted and enforced, or passed by in "silence, or rejected with contempt; that the great majority of towns through- "out the kingdom have no medical officers of health, and that, in those which "have them, their remuneration is, with three or four exceptions, shamefully "inadequate; and that their position of dependence on the local authorities is "such as often to make them comparatively powerless for good, especially when, "as sometimes happen, the authorities are interested in the perpetuation of the "abuses which their sanitary officers seek to remove."—("Medical Aspects of "Sanitary Reform," *Transactions of* 1866, Dr. A. P. Stewart.)

There was an annual excess of 32,735 deaths over and above the normal healthy standard, between the years 1851-60, in thirty large town districts alone (*Supplement, Twenty-fifth Report of Registrar-General*, p. 27), "which represents the penalty paid "by the country for the unfavourable sanitary condition in "which the people of those districts live and die." Well might the Registrar-General, in view of these things, exclaim in his latest Report:—"There is still something radically wrong in "the sanitary administration of the towns of the kingdom. "The root of the evil has not been reached. Vast numbers of "the population, increasing every year, are blighted by causes "which science has discovered, and which hygienic regulations "might control." Well, too, might the experienced officer, to whose Papers place has been given in the *Twenty-eighth and Twenty-ninth Reports*, add his testimony as follows:—"It is in "such districts that, when an epidemic breaks out, it finds its "greatest number of victims. In maps, shaded in the ratio of "mortality, the blackest tints cover these localities. But pesti- "lence, once established, is not confined to these places; it "spreads to better districts, and involves rich and poor in like "disaster. All ranks of persons are vitally interested in the "sanitary condition of their towns or villages: and upon all it "rests as a sacred duty to assist in promoting so great and noble "an enterprise."

Twelve years ago the chief medical adviser of the General Board of Health wrote as follows:—"Growing knowledge "should bear its fruit. It has now been fully recognised that, "within the very centres of civilization, controllable influences

"are working against human life more cruelly than brute "violence ever worked in the first discordant beginnings of "society. It has been shown that in certain districts of "England the operation of those controllable causes is vastly "more powerful than in others; that, within the rule of cer- "tain sanitary authorities, particular forms of disease undergo "a multiplication—a fivefold, and tenfold, and hundredfold "multiplication of their lowest familiar fatality. To suppose "that such sanitary authority could permanently disavow an "interest in this knowledge, or that public opinion could long "hold them irresponsible for so monstrous a waste of life, would "be to misunderstand the meaning of civilization, or to belie "the humanity of England."

Six years later the Medical Officer again writes, as if in despair, after citing forty-three instances of typhoidal and diarrhœal outbreaks in the course of the year, in eleven of which local inspections were made,—"The main governing "conditions for epidemics of typhoid and diarrhœa infection "were invariably, in greater or less extent, the population "breathing the stench or drinking the filtrate of its own "decomposing excrement, and the legislative question suggests "itself, whether for the public interest it ought to remain "discretionary with local authorities to leave such local in- "fluences in full operation."—(*Sixth Report Public Health*, 1864, p. 83.)

IV.

THE HEALTH OF TOWNS.

In 1858, Parliament, yielding to the claim set up by the towns to independent and uncontrolled action in matters of the public health, shelved the General Board of Health, and, relinquishing any further effort for a general sanitary organization, passed the Local Government Act of that year. In so doing, the principle of governmental supervision of the national health was abandoned, and the sanitary welfare of the nation was committed for the future to the local authorities. "It was hoped," to use the words of the Registrar-General, "that a generous rivalry in the "race of improvement would develop itself in the cities, and "that the municipal authorities would lay a solid foundation for "the sanitary edifice by bringing pure water on the constant "supply system to every house, and carrying away the dirt of "cesspools, which is the source of zymotic disease, to fructify "the soil, and that they would undertake, besides, the inspec-"tion of articles of food by health officers, and measures for the "regulation of lodging-houses or of any of the houses in which "fever is generated, and other duties connected with the same "object." The General Board of Health, in their several Reports, and particularly in their Report of 1854, had placed on record a statement of the measures adopted and the work done by them during their tenure of office. Of the sanitary history of the towns since they undertook to discharge the weighty trust committed to them we possess no similar collective record, and it is, therefore, impossible to say how far the expectations expressed in the above extract have been fulfilled. Some particulars are, however, furnished from a return printed by order of the House of Commons, in April, 1866, showing the "Expense incurred for works of Sewerage, Water Supply, "Street Improvement, Public Pleasure Grounds, and other "sanitary works, completed or in progress, under the Public "Health Act of 1848 and the Local Government Act of 1858, "and the total amount raised on account of such works on the

"security of the rates." The return is very imperfect. Many towns and boroughs, then under those Acts, do not appear to have responded to the call, or had no return to make, and it does not include the townships managed under separate Acts, such as Birmingham, Manchester, Liverpool, and others.* Only 125 out of the 580 cities, boroughs, and towns, borne on the official Census Tables of England and Wales for the year 1861, appear in the return of 1866; but imperfect as it is, it yields some interesting information. The highest figures of expenditure in round numbers, above £20,000, are given as follows:—

Name.	Population of 1861.	Total Expenditure. £	Main Drainage. £	Water Supply. £
Bolton	70,000	97,000	38,168	26,420
Barnsley	17,000	76,900	7,266	65,000
Carlisle	29,000	101,610	26,000	not stated
Chorley	15,000	29,000	11,000	Do.
Hull	97,000	55,000	22,000	Do.
Leicester	68,000	55,000	16,000	17,000
Llanelly	11,000	30,000	6,500	14,000
Oldham	72,000	75,000	9,000	not stated
Plymouth	62,000	86,000	30,000	Do.
Preston	82,000	296,000	49,000	230,000
Rugby	7,800	27,000	5,700	19,000
Salisbury	12,000	31,000	13,000	14,000
Staleybridge	24,000	26,000	6,000	20,000
Worcester	31,000	53,000	21,000	30,000

* H.M.'s Commissioners, in their Report on the Mersey and Ribble Basins, 1870, furnish a tabular statement of the declared cost of Waterworks for the twenty-one towns comprised in that area, amounting in all to £6,139,000, out of which Liverpool and Manchester figure respectively for the sums of £2,000,000 and £1,780,000, and commend the resolution, enterprise, and success with which the difficulties connected with the enormous water supply needed in South Lancashire have been encountered; but so rapidly do the water wants of great towns grow that Liverpool, after "laying its paw" on the gathering grounds of other towns as well as its own, is again in great water straits.—(*Minutes of Evidence, Royal Commission on Water Supply*, p. 26, 1869.) The Report of 1867 on the Aire and Calder Basins presents a very much less favourable view of the water supply of the eleven towns comprised in that area, of which Leeds is the chief and centre. The Minutes of Evidence, accompanying the Reports, supply on the other hand the details of the gigantic counteracting difficulties arising from the rapid agglomerations and shifting areas of their several populations, which have neutralized the benefits of the water supply, and established the causes of their increased and increasing unhealthiness.

Besides the above, 19 districts of minor importance figure for an expenditure of sums ranging from £10,000 to £20,000. The only large town in the second list is Nottingham, which, with its population of 74,000, figures only for an expenditure of £11,000 for Main Drainage. All the 125 town districts make a return for Main Drainage, at varying amounts from £3 upwards; and the same for Water Supply, from the sum of £28 expended "in repair of the public pumps at Calne," to the large outlay of £230,000 for this purpose at Preston.

A significant entry appears under Tamworth, viz.:—"No "works of sewerage or water supply have as yet been com- "menced under the Local Government Act; plans and esti- "mates for the purpose were obtained, but a great clamour has "been raised in the town against the proposed works, in conse- "quence of which nothing has been done." Unfortunately for the health of Tamworth, the matter did not rest here. Twice the town crops up with unfavourable notices in the Reports of 1866-67; and in the Registrar-General's last Quarterly Report of 1867 it is recorded:—"There has been much fever in the "borough of Tamworth. The town is in a very bad state, "abounding with nuisances, none of which are ever removed "by the authorities. The mortality bears but a small propor- "tion to the amount of sickness occasioned by the extremely "filthy condition of the town." Tamworth appears again in the third Quarterly Report of 1868, with a death-rate enhanced twofold, the chief losses, as is usual under these conditions, being of children under five years of age. Once more, Tamworth appeared about the same time in a Paper read by Professor Alfred Hill, M.D., at the Birmingham Conference, with the following notice attached to it:—"In Tamworth, where the "table shows the well water to be excessively bad, disease is "fearfully rife. One medical man informs me that, from 'his "'own knowledge, typhoid and diarrhœa are exceedingly preva- "'lent;' that in one house where one of the above waters was "used, 'he had about eighteen months ago ten cases of typhoid.' "He adds, that there was considerable improvement in the "health of those who were at the trouble to obtain pure water,

"and that he has 'always considered that the *endemics* of Tam- "worth were essentially due to drinking impure waters.'"

If Public Health be, as it has been declared to be, Public Wealth, "if these five words do, indeed, form an adage of "momentous import and stern truth,"* if it be true "that the "gain of lives annually would pay ten times over the cost of "all the exertions that might arise to secure them for life and "for their country,"† then what has been the cost of Tamworth to the State and the community at large, and how many more Tamworths are there in the country?

* Sir James Simpson, Bart., M.D., F.R.S., Address "On Health," *Transactions of* 1867.

† Edwin Lankester, M.D., F.R.S.

v.

THE HEALTH OF TOWNS.

"Every man who is obstructed by sickness from working his "work and doing his duty as a citizen, is necessarily a loss to "the revenues of the State at large. If we have a community "of ten thousand, with one hundred sick, the wealth-producing "power of this hundred is not only taken from the public "purse, but ten or twenty citizens have to be told off to attend "to them in their sickness; and during their term of illness "the sustenance of the sick and their attendants is required to "be obtained from public or private sources. But further, if "from the severity of the disease, five or ten adults—fathers "and mothers—in this hundred die, the consequent loss to the "community is difficult to calculate, as their children might "require to be sustained, and the status of their families be "deteriorated morally and materially. It is impossible, indeed, "to estimate in mere yellow gold the value of the life of a "father, however humble a mechanic he may be, cut down "prematurely by disease and death."*

Such being the value of lives to the nation, its aggregate losses can be better estimated by taking the annual mortality of the different diseases which rank as preventable. Cities have been declared to be "the graves of our population," and it is chiefly amongst their increased and increasing numbers that the evidence will be found. 116,000 perished from preventable disease in England alone in 1866, a not unhealthy year. Out of this sum total, consumption, "a town disease, "the offspring of imperfect nutrition and impure air," "at "once the cause and the test of the deterioration of a race in "physical excellence," "a disease for prevention, and not for "cure; and even when developed, more fitted for sanitary "than for medical treatment," took 56,000 lives. Scarlatina and diphtheria, "both implying, when in excess, great defects in

* Sir James Simpson, Bart., M.D., F.R.S.

"the conservancy" (*Twenty-ninth Annual Report*, pp. 175, 176), carried off 15,000. Typhus and typhoid, both "artificial diseases," and both rapidly on the increase—typhus, the product of overcrowding and bad air, and typhoid, the "emana-"tion from putrid drains and decomposing animal matter placed "in and around the dwellings of those attacked, and sustained "by increasing contamination of the waters," took 21,000 more. Both forms of fever peculiarly affect those in the prime of life, the fathers of young families and the workers of the community. Nor are they confined to these classes, but they are found amongst all, in the best houses as well as in the second-rate dwellings, down to the worst. Endemic diarrhœa, "an in-"cessant witness to the same deleterious influences," slew its 17,000. It is not without good cause that the Medical Officer of the Privy Council, in his Ninth Report, exclaims, "The "mere quantity of this wasted life is something horrible to "contemplate, and the mode in which the waste is caused is "surely nothing less than shameful. It is to be hoped that as "the education of the country advances, this sort of thing will "come to an end; that so much preventable death will not "always be accepted as a fate; that for a population to be thus "poisoned by its own excrement, will some day be deemed "ignominious and intolerable."

The General Board of Health in their Report, dated in 1854, observe on the same subject:—

"The operation of excessive mortality caused by the frequent recurrence of "ordinary epidemic diseases may thus be illustrated. Excessive mortality "prevalent in any town or district is preceded by excessive sickness, there "being numerous cases of sickness to one death. The wide-spread sickness, "when not proving fatal in a few days or weeks, does so to a vast extent "in the course of a few years, by producing slow disease in some vital organ, "without leaving a single intervening day of real health or good working "ability. Even when such sickness is not sufficiently acute to produce organic "disease, it causes a state of depression. The evils, moral, social, and political, "resulting from the extensive prevalence of such a state, are of greater mag-"nitude even than those directly caused by the excess of rapidly fatal disease. "But this state of depression is the normal condition of the great majority "of the residents in all unhealthy districts and dwellings. The offspring of "people in this enfeebled condition are puny and sickly; one-half of the "children they produce perish before they reach the fifth year of age; very

"few of those who survive attain a healthy, strong, and vigorous manhood; "the entire generation is swept away at the average age, for each individual, "of twenty-nine years at most; the children born of this short-lived race "are still more enfeebled than their parents, and the physical deterioration "goes on increasing with each successive generation. The examination of "the birth-places of residents in unhealthy districts demonstrates that the "population of these localities could not be maintained, were it not for "immigration of robust labourers from less unhealthy and general rural "districts. On comparing the workmen born and bred in these unhealthy "districts with their parents who came from more healthy districts, it is found "that the descendants are lower in stature, less muscular, and less capable "of labour. To such a degree does this deterioration shorten life, that in "these districts it is difficult after a few years to trace the descendants of "the original inhabitants. There have been periods in the history of our "own country when the like deterioration of the population has been pro- "duced by war; but the physical deterioration caused by constant residence "under unhealthy conditions is more powerful and more constant than that "produced by the most devastating wars."

"Who" (asks Dr. Farr) "will deliver the nation from these "terrible enemies? Who will confer on the inhabitants of the "United Kingdom the blessings of health and long life? Who "will give scope to the improvement of the English race, so "that all its fine qualities may be developed to their full "extent under favourable circumstances? His conquests "would be wrought, neither by wrong or human slaughter, "but by the application of the powers of human nature to "the improvement of mankind."

Nine years have elapsed since the question was asked, and no response has yet been made. The subject of the conservancy of the national health, in Parliament, takes the form of a legislation either unworkable from its inherent defects,* or unworked, because there is no agency to enforce its provisions. The principle of governmental or national supervision of the public health has been thrown overboard in favour of the proverbially short-sighted ratepaying element in the towns, and the duties connected with it, which the interests of society require to be made obligatory and to be regarded as a sacred trust, have been left permissive. Lastly, the directorial power reserved to the Privy Council can only be exercised on special

* *Transactions of* 1868, p. 478. Also, Hutchins, "On Difficulties in Adminis- "tering some of the Sanitary Acts of Parliament in 1869."

occasions or in periods of national alarm, when too late for prevention; or, if it take the form of preventive counsels, it is liable to rough and ostentatious rejection from local authorities.

Permissive legislation has been described as little better than "legislative hinting;" and the Medical Officer of the Privy Council, in the last or Eleventh Report, observes, "Everyone "knows how valueless such legislation has been in the greater "part of the hitherto province of sanitary law, even as regards "objects of foremost necessity to the public health; so value- "less, that in all chief respects compulsory legislation has "always had to be substituted for it." The same authority, in a review of the laws and administrative agencies which con- cern the public health, observes, p. 20: "The principles now "affirmed in our statute-book are such as, if carried into full "effect, would soon reduce to quite insignificant amount our "present very large proportions of preventable disease. It is "the almost completely expressed intention of our law that all "such states of property, and all such modes of personal action "or inaction, as may be of danger to the public health, should "be brought within scope of summary procedure and preven- "tion. Large powers have been given to local authorities, and "numerous obligations have been expressly imposed on them. "If, however, we turn from contemplating the intention of the "Legislature, to consider the degree in which they are realized, "the contrast is curiously great. Not only have permissive "enactments remained, for the most part, unapplied in places "where their application has been desirable, not only have "various optional constructions and organizations which would "have conduced to physical well-being, and which such enact- "ments were designed to facilitate, remained in an immense "majority of cases unbegun; but even nuisances which the law "imperatively declares intolerable have, on an enormous scale, "been suffered to continue; while diseases which mainly repre- "sent the inoperativeness of nuisance laws have still been "occasioning, I believe, fully a fourth part of the entire "mortality of the country. And when inquiry is made into

"the meaning of this unprogressiveness in reforms intended "and in great part commanded by the Legislature, the expla- "nation is not far to seek. Its essence is in the form, or "perhaps I may rather say the formlessness, of the law. No "doubt there are here and there other faults. But the "essential fault is that laws which ought to be in the utmost "possible degree simple, coherent, and intelligible, are often, in "nearly the utmost possible degree complex, disjointed, and "obscure. Authorities and persons wishing to give them "effect, may often find almost insuperable difficulties in their "way; and authorities and persons with contrary disposition "can scarcely fail to find excuse or impunity for any amount "of malfeasance or evasion." The Medical Officer concludes his Report with a variety of valuable remarks and important suggestions for future legislative and administrative action.

VI.

THE HEALTH OF TOWNS.

The Medical Officer of the Privy Council, in his Ninth Report, expresses a hope that the waste of human life occasioned by the neglect of Sanitary Laws will come to an end as education advances; and the Medical Officer of the City of London, in his Report for 1861, after enumerating the causes of unhealthiness, viz., dense overcrowding, living in houses unfit for human habitation, the close and ill-ventilated state of the courts and alleys, the systematic neglect of cleanliness among the poor, and their living continually in an atmosphere of decomposition, insists on such teaching as an obligation of society, "for it is "perceived that the evils of such ignorance are not confined to "the poor alone. They spread among the rich, and largely "affect the interests of all."

It is obvious that the teaching thus inculcated, in order to be of use, must begin with the grades where it is most wanted, and of these we possess a sketch drawn by a powerful hand:—

"The master evil which nullifies every effort for the benefit of the working "people, which leaves us no rest, the evil that embraces and intensifies all "the others, the hot-bed of pauperism, immorality, disease, and drunkenness, "—drunkenness alternately the cause and consequence of disease, the evil "that is negative in preventing every improvement, and positive in maturing "every mischief; that lies at the root of nineteen-twentieths of the corruptions "that beset our social state, and forms the crowning abomination of the whole, "is the domiciliary condition of many thousands of our people. But we must "look not only to the pestilential character of the actual dwellings, but to the "unventilated, fever-breeding localities in which they stand; the dark, damp, "and narrow alleys never visited by a ray of the sun or a breath of fresh air. "To describe these things is impossible. They must be seen, smelt, tasted in "person. Dirt and disrepair, such as ordinary folks can form no notion of; "darkness that may be felt; odours that may be handled; faintness that can "hardly be resisted, hold despotic rule in these dens of despair."—(*Opening Address of the Earl of Shaftesbury, Social Science Association Meeting of* 1866.)

To this evidence other testimonies to the same effect may be added:—

"The breath of man is fatal to his fellows; more than that, it is fatal to "himself. It is now well known that there are certain diseases of which the "very essence is filth,—diseases which take no hold except where putrefiable "air or contaminated water affords means for their subsistence; and of these "diseases tens of thousands die. Typhus fever, the disease of the prime of life, "has its source especially in such impurity of air as is produced by over-"crowding, and is a constant cause of death, misery, and pauperism. We "have ague where we do not drain; we have fever where we overcrowd. The "money loss through typhus fever alone, during the last twenty years, would "have to be stated in millions. Even if death do not result, a low state of "health becomes the rule. I say, speaking literally, that thousands in this "country are only half alive, have never lived, and never either work or play "with whole life. A low state of health becomes chronic; they exist, they do "not live. An epidemic finds among them its ready victims."—George Godwin, F.R.S., *Transactions of* 1864. "Remember this, there must be a condition of "public health favourable to the diffusion of disease before it spreads to any "great extent, and it depends much on the condition of the population, and the "sanitary regulations that prevail, whether that disease will or will not sweep "away thousands from the town or locality in which it springs up."—("Infant "Mortality," by W. D. Husband, F.R.C.S., *ibid.*)

And yet few, comparatively, live in dirt by choice. In a Paper read by Mr. Henry Roberts, F.S.A., before the same Association in 1863, the opinion of an able and experienced physician, who had had many opportunities of studying the poor of London, is quoted as follows:—"My own impression is, "and I say it on due consideration, and with every possible "regard of truth, the poor make very great sacrifices in the "cause of cleanliness. They constantly aim at it, and constantly "fail, because it is impossible." The Commissioners of Inquiry into the Health of Towns, in their Second Report, A.D. 1845, bear similar testimony. Adverting to the common allegation that it is useless to improve the house inhabited by the poorer classes, because they would soon recur to their former condition, they observe: "These allegations have probably been drawn "from the fact of such large numbers of the poorer classes being "found to exist in their present miserable abodes, where they "are obliged to tolerate the scenes of filth around them to which "they become inured by habit, and continue to live among, from "the difficulty of finding better residences. It is certain that, "under such circumstances, better habits cannot be acquired, "nor, if in existence, are they likely to be retained. It cannot

"be denied that the poorer classes would most readily appre-"ciate any improvement which affords the means of speedily "removing the present accumulations of filth from the vicinity "of their houses, and which would free them from their injurious "consequences. Such amelioration of their dwellings by "improving their health, and enabling them to follow their "employments with fewer interruptions from sickness, would "also increase the means at their disposal for paying the rents, "and meeting the demands upon them."

Dr. Morgan observes, in a Paper read at Oxford in 1868: "There should be no waste, no useless expenditure of human "life. We are bound to see that as our toiling artizans are "amassing for us vast stores of national wealth, as they are "earning this wealth by labouring at manufactures and trades "which, in not a few instances, prove sorely detrimental to "their health, so we also must fulfil our duty towards them, "and take care that when they are assembled in the towns "they shall obtain that amount of shelter and breathing-room "which is indispensable to human beings if they are to enjoy "health themselves and not to endanger the safety of their "neighbours."

"Life," says Dr. Acland, "is a holy thing, and if communities "throw away the lives of the individuals who compose them, "or make these sickly, short, or miserable, the community will "in some manner pay for it. It will have work done badly "by the crushed artizan while he lives; it will maintain him "in his sickness, and his children at his death. In this "matter, as in many others, many of the people of England "have yet to awake as from a dream."—("Memoir of Cholera "at Oxford, 1856.")

Such, then, being the field of teaching, who, it may be asked, are to be the teachers? Certainly not the holders of house property, who are described in the above Report of 1861 as "nullifying the efforts of Sanitary Improvement by passive "resistance." "There is a large class of property to which the "owners will not do anything. 'Them as does repairs does it "'for themselves' was the answer of one of these gentlemen."—

(*Public Health Journal*, October, 1868.) "Cottage owners," Mr. Rawlinson says (*Transactions of* 1862), "oppose the intro-"duction of house drainage because they will feel the first cost, "and doubt as to any ultimate pecuniary benefit to themselves. "The presence of fever and of general sickness amongst the "tenants of their property is considered a matter of course." But the most unimpressionable of all others among a class whose extreme rights are found everywhere with, too often, a disregard of their corresponding duties, are the respectable owners of bad property. In a valuable essay "On the Homes of the Working Classes," by J. Hole, p. 117, the author observes: "Even the "owners of the worst description of cottage property know little "of it, as they draw their rents through agents, and, moreover, "have their perceptions blinded and their feelings blunted, "almost unconsciously, by pecuniary considerations. The "respectable citizen, who draws high percentages in the shape "of rent, never comes in contact with the horrid misery from "whose stinted resources the rent is squeezed; never thinks of "the anxious daily battle of life amid filth and fever from "whence his wealth is drawn. It is easy to ascertain this by "experiment. Traverse the courts and alleys, and the sight of "your respectable coat will soon bring out some of the "inhabitants, and it will be found that they only know their "pot-landlord—*i.e.*, the agent, and perhaps either never knew, "or have forgotten, the name of the real owner." Another authority observes: "Proprietors of old houses, in order to "avoid coming in contact with the tenants, very frequently "place them in the hands of factors, who have no interest in the "tenants, and take no trouble farther than to exact the last "penny that can be got from them, without much respect to the "accommodation provided."—(*Transactions of* 1863, p. 494.)

Long prior to the present time the same evils arrested the attention of those who were competent to pronounce on them. "I may confidently appeal to professional men whether they "ever witness fevers or other diseases assuming elsewhere "anything approaching to the malignant and fatal character "which too often marks their progress amongst the poor.

"Much is, doubtless, referable to the superior comforts and "precaution of the one class in contradistinction to the privations "and neglect of the other. At the same time I am convinced "that the magnitude of the mischief is traceable to causes not "inherently or essentially attaching to the poor, *quasi* poor, but "to their needless exposure to many noxious and positive "influences, internal and external to their habitations, which "admit of ready correction or removal.* I allude in particular "to those previously enumerated—defective drainage, imperfect "ventilation, crowded and badly constructed dwellings, and "want of cleanliness—the latter being connected with the "absence of proper supplies of water. And why, let me ask, "should persons be allowed to erect human habitations in "situations and constructions so palpably at variance with every "principle of health or convenience? What right has any man "to crowd human beings, poor though they be, into a space "utterly incompatible with wholesome, not to say comfortable "existence? Upon what grounds does any one presume to "confine this less fortunate portion of his species within limits "infinitely too small and obviously insufficient for the main-"tenance of the healthy functions of vitality? What avail "public generosity and private benevolence, our hospitals and "dispensaries, if their funds are to be expended and their wards "are to be peopled with the inmates of these dens and hovels of "infection? It is sacrificing the charity of the many to the "cupidity and recklessness of the few; it is catering for the

* There is much quiet pathos in the following extract from the *Report of the Commissioners of Inquiry*, A.D. 1845. The family of E. S. inhabited an underground kitchen with filthy surroundings. The evidence of the mother of the family was as follows:—"Q. How long have you resided here? A. Nearly "two years. Q. Have you enjoyed good health since then? A. No; all our "troubles have come on us here. I used to be strong and lusty and able to "work, but now I am weak and sickly. I have had many children, and never "suffered from my confinements till I came to this place; but since then I have "had two dead-born children. But what distresses me so much is that my "children, who were healthy before, are becoming very puny, and my husband "is not able for the work he used to do. God has dealt hardly with us for two "years."

"victims of a sordid and unprincipled speculation."*—(W. Kay, M.D., *Second Report of Commissioners of Inquiry*, 1845.) These descriptions will be found applicable in many places, not only to the "cottage owners" and "respectable citizens," but to the rich and powerful, who would rest ill in their beds if they were willing and able to pay an Asmodeus-like visit to some of their town property.

"The fact is," Mr. Hole observes, "not that the public are "indifferent, but that they are ignorant. The fearful condition "of great portions of our large towns would not be tolerated "were it adequately understood. These evils have so long a "life because the middle and upper classes have no personal, "concrete knowledge of them, but only some dim, abstract idea, "gathered from newspapers and speeches, that things are not "quite as they should be." This want of accurate information becomes of serious moment when the field of sanitary legislation is entered upon.†

Those who should, from their position, stand in the place of the teachers and protectors of their tenants, thus failing, will their official protectors do better? Immense powers for good and evil have been lodged unreservedly in their hands, and they may fairly be said to hold in them the issues of health and disease, life or death, for the population of their towns. The response is not a favourable one. From the ranks of society where the rate-paying interest is predominant, and where all sanitary amelioration is viewed through the spectacles of present expense, effectual remedies are difficult of obtainment. "The "great obstacle to the efficiency of our sanitary legislation lies "in the fact that the Town Councils in boroughs, and the Poor-"Law Guardians in other places, constitute *ex officio* the Local "Board of Health. The members of these bodies are chosen by "popular vote by electioneering means, without any reference "to sanitary qualifications, and too often on grounds which are "precisely such as ought to have rendered them ineligible."—(Dr. R. Elliot, of Carlisle. *Transactions of* 1867.) "The local "authorities are more or less unlearned, and for that reason

* See Appendix, No. 3. † See Appendix, No. 4.

"require plain and special directions. They are interested in "diminishing the rates, unmindful of the probable costliness "of their parsimony, and they are, therefore, frequently un-"willing to act in sanitary matters, except under compulsion. "They are often ignorant of the importance of sanitary pre-"cautions, and indifferent to flagrant nuisances, and to the "serious consequences arising therefrom to individuals, "to others beyond the offending district, and to society at "large."—(Extract of a Memorial presented to the President of the Privy Council by the Council of the National Association. *Transactions of* 1866.) The memorial concludes with the recommendation, that as permissive enactments are generally taken to be permission not to act, their most useful provisions should be made peremptory, and that, as the inefficiency in the administration of the Health Laws by the local authorities was due partly to the absence of a central power, such power should be established.*

* In order to balance the opinions cited in this page, those of an experienced officer on the same subject are subjoined. The Medical Officer of the General Board of Health observes, in his Report to that body, referred to in chap. viii.: "My own seven years' experience in the service of a local sanitary authority "has given me a strong belief in the general disposition of such authorities to "exert themselves efficiently against the causes of premature death, when but "once they have become fully and publicly informed of the existence and "fatality of such causes. *Fully informed*, I say; because the non-removal of "evils which occasion so much human misery commonly depends much less on "the supineness of the local authority, as its primary cause, than on the absence "of local consciousness as to the real facts of the case. *Publicly informed*, I say; "because local sanitary authorities, exercising their powers virtually without "control, and being, like individual men, not incapable of indolence and error, "peculiarly require that their fulfilment of very important duties should be "subject to public criticism. Failing this check, it is unquestionable that the "existing constitution of such authorities must sometimes endanger the objects "for which they are constituted. Elected on the principle of being the repre-"sentatives of ratepayers, the members are sometimes a little apt to forget that, "for sanitary purposes, they are also the appointed guardians of masses of "human beings whose lives are at stake in the business. They do not always "remember that the interests of life are at least as sacred as the interests of "wealth. And this danger especially deserves to be guarded against; for it "has not infrequently happened that local owners of low house property have "procured themselves to be elected members of sanitary boards, with a view to "the protection of their own unworthy interests by systematic resistance to "sanitary improvement. Holding the opinion which I have stated as to the

Another fact, in itself productive of much mischief, is glanced at by Dr. Elliot. "In most communities, there was a "prejudice against the disclosure of facts which tended to "place the town in an invidious light." "Short-sighted "persons," says another authority, H. W. Rumsey, M.D. (Essays "On State Medicine," p. 119), "suppose that the value "of property and the success of trade, in their respective "neighbourhoods, depend on the concealment of such facts. "They hastily assume that local interests may be injured by "unwholesome disclosures, forgetting that sound measures of "medical police, based on impartial inquiry, are particularly "calculated to improve every legitimate source of income, and "to promote all just and right investments of capital. But "let us hope that the objectors are in a miserable minority. "Happily, the moralist, the philanthropist, and the political "economist are agreed that the permanent prosperity, collective "and individual, of any community depends on an open and "fearless exposure of whatever circumstances tend to deteriorate "the physical condition, and to impair the vital force of those "who compose it." When such a feeling gathers strength in a community unwilling to undertake the necessary sanitary reforms, it will find its expression in an incessant and uneasy desire "to make things pleasant." Vain eulogy will take the place of honest endeavour, and the hard facts which present themselves from time to time will be smoothed away, frequently at the sacrifice of the public health.*

Such are but a few leaves from the tree from which a number of testimonies to the same effect might be largely gathered. It may be urged that this is an unjust representation of corporate bodies in the mass. Exceptions, no doubt, there

"meaning of high special death-rates; feeling convinced that they substantially "depend on the non-removal of local and removable causes, and that this non- "removal commonly results from the absence of adequate local information as "to the nature and extent of the existing evils, I would look to the systematic "publication of facts, and to the influence of general opinion, as the main "agencies of cure. In the last resort, if those means should fail, other "remedies would assuredly not be wanting."

* See Appendix, No. 5.

are—not a few—of those who have been wise in time, and trimmed their lamps or done their best to do so, and who have derived thereby present profit and the satisfaction of a good conscience. The ninth volume of the Reports of the Medical Member of the Privy Council has shown how the lives and happiness of the dwellers in towns* have been extended and improved by wise expenditure for sanitary objects, and the list already given tells us what other places have done and are doing. The great centres of commerce and population, with their large means and equally large difficulties, stand on a footing of their own, and "have effected the accomplishment "of some really great undertakings," "by an expenditure "honourably directed to the public good;" but very much remains to be done. The Registrar-General supplies the latest comment, viz. :—

"While the average mortality in 14 great towns was at the annual rate of 26 "deaths in 1,000 living, it was 21 in Bristol, 21 in Birmingham, 25 in London, "29 in Liverpool, 31 in Manchester, 33 in Salford, 28 in Bradford, 32 in Leeds, "29 in Edinburgh, 33 in Glasgow. When will the North undertake the noble "work of saving the lives of the people? Why should industrious, prosperous, "and wealthy communities see their people perish year after year at these "appalling rates without trying some radical and effectual measures of reform? "This is not a question of mere opinion, but of life and death; it is not a ques- "tion of the day only, but of all time. Shall the town breeds of the North "degenerate and die out, or improve and live? There appear to be disputes as "to the particular measures to be adopted: why should not experiments be at "once made in various blocks of houses? The water supply is an excellent pre- "liminary, but the sewers must follow? The refuse must be day by day "removed from the dwellings, and this the householder cannot himself accom- "plish in large towns. It is municipal work."—(*Quarterly Report of Registrar-General, 4th Quarter of* 1868.)†

So that the good example that might justly have been expected from the larger and wealthier communities is often wanting as an element in this education.

Local authorities, thus failing in their turn as teachers, will society at large do better? The Registrar-General, in his

* Namely, a list of 25 towns from Alnwick to Worthing, with a statement in detail of the results of the works undertaken for the promotion of the public health.

† See Appendix, No. 6.

Twentieth Report, tells us that in the matter of health we are all "very ignorant or desperately negligent;" and in proof of the same he points to 91,652 "unnatural deaths" in England and Wales, and to 140,000 in the whole kingdom for a single year. And in regard to those who should be its leaders in this first school of knowledge, Dr. Lankester observes (*Social Science Papers*, 1865-66): "What is really wanted in our country is an "intelligent community to take an interest in matters relating "to public health. Our present sanitary defects are all more or "less traceable to the culpable practice of omitting from our "systems of education an inculcation of a knowledge of those "laws by which God governs the life and health of man. "Those laws have been ignored and trodden under foot, alike "by the so-called educated and refined, as by the ignorant "masses, and the consequences have been the dire judgments "of the Almighty, in the form of poverty, pestilence, and "death."

Meanwhile, the patient, in default of this teaching, has made his bed for himself in diseases. "In spite of gin, typhus, "and infanticide, a degraded, immoral, diseased, and altogether "a dangerous class is being bred in our land, who will in our "time, or soon after, shake the social fabric."—("Fever in London," by W. Rendle.) "This is no slight matter. The "evil is sapping the strength of the land, and concerns as well "the political economist as the philanthropist and the Chris-"tian."—(Geo. Godwin, F.R.S., *Transactions*, 1862, p. 601.)

To the above the testimony of another competent witness, F. E. Anstie, M.D., may be added from his "Notes on Epidemics." "It is the simple truth that on the rapidity with "which we may be able to introduce the more important of "those sanitary improvements which tend to exterminate "epidemic diseases, will depend very much of the greatness or "feebleness of England as a nation during the next half century. "The influence exerted on the labouring populations of crowded "towns by the constant presence of such a disease as typhus, "and by the havoc committed among their families by other "epidemic diseases, is not merely disastrous to life, but highly

"demoralizing, because it originates such a sense of the in-"security of life as tends to render the lowest classes more "and more reckless, and more and more incapable of raising "themselves from their debased condition. Few are aware to "what a length we have already gone, in this metropolis, "towards the creation of a 'dangerous' class by our neglect of "the most obvious facts. Assuredly, if we shut our eyes "much longer to the dangerous tendencies of the present state "of things, we, or our immediate successors, will have occasion "bitterly to regret our folly. It is our *slowness of action* which "is so perilous; and any statesman who would devote his "talents to the organization of a really authoritative medical "direction of sanitary reform, would deserve the sincere grati-"tude of his country."

VII.

THE HEALTH OF TOWNS.

"The apathy of the public in matters of the public health until "panic rouses them to action," has been the subject of constant comment. In ordinary times, whenever sanitary questions are started, the word "Education" is pronounced as a panacea, but the source from which the education is to proceed, as well as the thing itself, is overlooked in these self-satisfied utterances. An able writer* has told us what education really is. "We often "speak of education in a hurried and mistaken way, and in "connection with it, speak of schools. There is an error in this. "Instruction is the work of the schools; education is the business "of the home. It is there that the feelings, affections, habits, "and aspirations which govern the conduct of the future life are "matured, and the happiness or misery, the success or failure "of the man, depends upon the training of the child. What "can be expected of the neglected child when ripened into the "man? Upon the domestic character is based that of the "citizen. A love of country is not likely to exist where there "has never been a love of home. Guizot said long ago, 'Home "is the domestic country of the man,' and he pointed to the "cultivation of the family ties as essential to the growth of "true patriotism. There is no sentimentalism in this, and that "country which neglects so impressive a lesson must expect to "reap a bitter harvest of discontent and disaffection."

The homes from which this education is to proceed for the classes who most need it, have been sketched by an authority already quoted. "The people who lived in the horrible courts "of London, and seldom emerged beyond their portals, were "just as wild and inaccessible as if they were in the heart of "Timbuctoo. He believed it could not be gainsaid, that in "nine cases out of ten a diseased population was an immoral "population, and that as much intoxication came from disease "as disease did from intoxication; the two acted and reacted

* *Social Science Papers*, 1865-66, p. 84, Thomas Beggs, F.S.S.

"upon one another. To improve the moral condition of the "people we must improve their domiciliary condition; and in "doing so we should destroy their appetite for spirituous "liquors. Intoxication was almost forced upon the people by "the depressing influence of the localities in which they lived. "Having gone for hours together through filthy localities, he "could assert from experience that the atmospheric influences, "the sights, and the smells he exposed himself to, produced "such a weakness and faintness that he would have given any-"thing for a glass of spirits to sustain his sinking nature. If "that were the case with himself, who was generally well fed "and in good health, what must be the case with those who "lived in such places perpetually."—(Earl of Shaftesbury, President of the Social Science Association, 1866.)

It may safely be asserted that if a small part of the vigour shown in carrying through the late Cattle Diseases Prevention Bill, and in giving effect to its provisions, had been applied in prosecuting the causes of the diseases which yearly afflict the human family, many a dark page would have already disappeared from the sanitary records of the country.* For these

* It is known that the medical inspectors of the Privy Council have been making investigations concerning the cholera outbreak in East London. For these important services the grant of £600 has been assigned. The Commissioners who investigated the cattle plague, and had some thousands placed at their disposal, complained that they were stinted. (*Lancet*, quoted in *Journal of Social Science* for 1866.) A registration of sickness which was attempted for London by the voluntary public-spirited efforts of the Metropolitan Officers of Health failed, owing to the withdrawal of a small grant from the Treasury for the expense of publishing the returns. (*Transactions* 1861, p. 538.) Local authorities in the country districts are now required to report outbreaks of cattle disease, but no other. And yet the country has its sanitary dangers as well as the town. "Everything in country districts has to wait patiently the "action of mere natural chemistry" (*Twenty-sixth Annual Report, Registrar-General*, p. 31), until outbreaks of disease occur, as in the instances of Terling, Winterton, and many others, which momentarily startle the public mind, and prove that country air is no specific against physical and moral evil, and that the village population perish as miserably from these causes as the inhabitants of towns. "The urgency, almost the clamour, with which researches were "recently called for in relation to the cattle plague, and the scale on which "the Royal Cattle Plague Commission ordered them," has been mentioned by Mr. Simon in the *Public Health Report of* 1865, p. 21. "Are the lives of "bullocks," Dr. Budd asks (*Transactions of* 1869, p. 392) "more sacred than

shortcomings the public at large have been pronounced responsible. Dr. Lankester observes in his Address, "On Health" (*Transactions of* 1865): "I am aware how fully the laws "represent the feelings and opinions of the people of this "country, and if the law is inefficient or unacted upon, it arises "from a want of knowledge on the part of the people themselves. Not only does this ignorance tell upon the Legislature, but even if it were possible for the Legislature to provide "all the conditions of a healthy existence, this object could not "be obtained unless the people were sufficiently instructed to "avail themselves of the rights thus conferred upon them. I "have alluded to some of the great facts upon a knowledge of "which our healthy existence depends. It is in vain that the "Legislature enacts a plan upon which houses shall be built to "ensure ventilation, unless the inhabitants of those houses "understand the worth of fresh air. In vain is fresh water "brought to our doors, if in our ignorance and indolence we "refuse to use it. There must be intelligence both in the "legislator and those for whom he legislates, if we are to take "advantage of our present knowledge of the laws of life to "secure us from disease and death." Such being the general ignorance, to postpone State action until the people were educated, would be to neglect the State's noblest function, and to consign the country meanwhile to very great dangers.—(*Transactions of* 1869, p. 411.)

In order to cope with these terrible evils, various suggestions have been made from time to time. Private benevolence has been invoked, and it has displayed itself of late in several striking instances too well known to require mention. The action of philanthropic associations has already been advocated in the form of Freehold Land Societies and Building Societies, and good has been done by them in many instances to those who were willing to make efforts for their own improvement,

"the lives of men, and sheep more precious than children?" "Why," asks Mr. Simon, "should not human life receive the same administrative safe-"guards as the money interests of cattle-keepers?"—(*Twelfth Report Public Health*, p. 14.)

and who aspired to better things, and welcomed the help tendered to them; but to talk about private benevolence as applicable to the larger sanitary requirements of the age in regard to water supply or house accommodation has been declared by competent authorities to be little short of nonsense, even if it were wise to rely on such exertions as pure benevolence might originate; and the action of private companies has been pronounced by another authority (R. Rawlinson, C.B., *Social Science Papers*, 1865-66, p. 86) to be "but a mere drop in "the ocean to that which was required. As a mere matter of "pounds, shillings, and pence, it would pay the country to "sweep away all the fever-ridden spots in the land, and let the "people have buildings where health could be enjoyed, morality "observed, and Christian feelings taught. These seats of fever "and deplorable wretchedness were more costly, yard by yard, "than any part of the Queen's palaces; they absolutely cost "the country more in money." Another authority, George Godwin, F.R.S. (*Transactions of* 1864), tells us that it would be cheaper to the country, in the end, to pick up the young in these haunts of unhealthiness and vice, and to give them costly education at the expense of the State, than to suffer them to remain in their present condition.

A third expedient has been resorted to, as a preventive, in the form of voluntary sanitary associations in towns, and it has been worked with good effect in assisting the efforts of the local authorities, or stimulating them to action.—(*Transactions*, 1866, p. 459.) Dr. Morgan, in his Paper "On the Health of Towns" (*Transactions of* 1865), in commenting on the manner in which epidemics in towns radiate from centres—frequently at first from a single centre, and after a while from many, and on the importance of the establishment of effective measures to check the spreading of infectious diseases, observes: "My "experience in analysing the disease returns of the Manchester "and Salford Sanitary Association convinces me that, if we "would enlarge our acquaintance with many interesting pro-"blems connected with the public health, we must no longer "confine our inquiries to the registration of deaths, but extend

" them to returns of diseases. Such statistics have for several " years been successfully collected by the Manchester and Sal- " ford Sanitary Association. No fewer than twenty-eight mem- " bers of the medical profession connected with the Poor-Law " Unions, the hospitals, the workhouses, and gaols, unite in " furnishing weekly returns respecting the number and nature " of the new cases of disease which may come under their own " personal observation. In addition to these tabulated statistics, " they frequently specify the particular houses affected by con- " tagious diseases, the causes which appeared to excite them, " and other interesting points bearing on the public health. A " return, with a summary, drawn up by the Honorary Secre- " tary, is now published at the end of every week, and inserted " in the daily papers. In this manner the very first outbreak " of an epidemic, and the quarter in which it may appear, are " speedily noted; while the amount of sickness which pre- " vails among a population of half a million may be read at a " glance. On the intensity which some of the more formidable " diseases assume during different epidemics, and on the " localities they select as their most congenial haunts, much " interesting information is accumulating in these returns—the " more interesting from the little attention these questions have " hitherto received."

It has been a subject of remark ever since the *Second Report of the Commissioners of Inquiry of the year* 1845, p. 86, what a vast mass of material derivable from the returns of the Poor-Law medical officers, and the hospital and dispensary records, lies unemployed and useless, which, if properly classified and localized, and illustrated by a chart, would afford a certain index to town diseases, and enable the medical officers to lay their fingers at once on the spots requiring their preventive vigilance; but for this purpose the services of a medical officer of health, and the hearty co-operation of the local authorities and the more intelligent part of the community are needed. The uses to which a mortality chart can be turned have been shown by the excellent Memoir "On the Health and Meteorology of Hull for 1868," by Angus Macmillan, M.D., who, at

the close of it, regrets the absence of means for ascertaining the existence of disease, which by prompt interference would check it in its further development, and thereby save the community many valuable lives. The importance of a national registration of sickness from these sources has also been forcibly urged by Dr. Ballard in the last *Public Health Report;* and the volume of the *Transactions for* 1861 contains an interesting Paper by Dr. Richardson, detailing the commencement of an effort of several of the medical faculty in different parts of the country to supply this great public want, the progress of the work for four years, and its ultimate cessation for want of pecuniary support, its very success having brought the work at last to a standstill.

VIII.

THE HEALTH OF TOWNS.

PRIVATE benevolence, philanthropic and sanitary associations, permissive legislation, and public opinion, having thus failed to meet the crying exigencies of the time, the efficacy of the direct action of the Government remains to be considered.

This was exercised for several years with excellent results under "The Health of Towns Act of 1848," by means of the General Board of Health. Whether viewed under their nominal appellation of a Health Board, or in their practical operations as a Board of Works, they did great things.* Sound principles and methods of sewering were laid down, and a consequent improvement in the public health effected, together with a great saving of money to the community; a system of preventive measures was organized to meet the visitations of cholera; methods of its treatment, founded on information gathered from every quarter, were suggested; the utility of quarantine was investigated and condemned; schemes for extramural interment were framed; an improved system of water supply was investigated; and a decided preference was given to the retention of the supply by the local authorities in their own hands over the relinquishment of a public work of such vast importance to the community into the hands of trading companies. In this conclusion their opinions coincided with those of the Commissioners of Inquiry into the Health of Towns, who, in their Second Report of the year 1845, had entered into the question in some detail, and arrived at the same result. It would have been well for many a town in the kingdom, the metropolis included, if they had followed this counsel. Besides the above labours, aid and advice were largely extended to all who chose to apply for it, particularly in regard to the reduction of the expenses incurred under the old cumbrous methods of proceeding, and information was collected and diffused respecting the principles and objects of the Act of 1848. The Board was remodelled in 1854, with a seat in Parliament for its President, and its renewed functions terminated in their laying before the House in 1858 a remarkable Report relating to the sanitary state of the people of England, by Dr. Headlam Greenhow, exposing to view the existing wasteful expenditure of human life throughout the country, prefaced by an introductory Report of the Medical Officer of the Board, full of precepts of sanitary wisdom.

* *Reports of the General Board of Health*, 1854 *and* 1855.

These, and a variety of other measures, all bearing on the public health, and prosecuted in the midst of much open and secret opposition and misrepresentation from "ignorance, preju-"dice, and very powerful adverse interests," occupied the Board in their 1,245 sittings during the six years between 1848 and 1853, the names of Carlisle, Shaftesbury, Chadwick and Southwood Smith, being the guarantees for the efficiency of their labours. Allowance being made for "the one-sidedness of their "doctrines on certain disputed points of medical opinion," an excellent school of sanitary instruction had been instituted, and a fair way was laid open to some general sanitary organization. The municipal governments, however, resisting even advice and assistance from without, proved too strong in the end, and after a few years' struggle the New Local Government Act of 1858 was passed, which abolished the Board, and cast adrift the principle of governmental or national direction of the public health,* a State duty which appears to have so completely vanished from view that it has found no place in the Paper "On the Principles and Functions of Government," read at the Birmingham Association Meeting of 1868. The step was a retrogressive one. What was obligatory before became optional after its enactment. "The most flagrant fault in the legislation "of 1858 lay in the adoption of Sanitary Statutes being made "to depend on consent."—(*Evidence, Royal Sanitary Commission*, 1869, p. 266.) The voluntary principle has no place in matters which deal with the national existence, and are annually of life and death to tens of thousands.

* Address "On Health," by H. W. Rumsey, M.D., *Transactions of* 1868.

The place of the Board has since been taken in part by the Privy Council, which has laid down most important sanitary principles, and taken in hand from time to time many valuable and interesting local investigations into outbreaks of disease, and the sanitary condition of classes of the population, but its powers of action are limited to great epidemic visitations; and in cases where the law is not imperative, however urgent they may be, it has found in the instance of District Boards of Guardians, as in that of towns, "that the Legislature has made "no provision against voluntary neglect and perverseness."—(*Eighth Report Public Health*, p. 23.) Much was expected from the coercive action of the Secretary of State under Sec. 49 of the Sanitary Act of 1866; but the time a high State functionary has to give to such details is so small, that the work of the section must, in practice, become a matter of mere official routine.

Such, then, is the position in which England stands at present. The evils are material, and may be met by material means. The moral causes open out a different field for reflection. It has been observed, "The rapid growth of our commer- "cial system, our achievements in the arts, and the marvellous "increase of wealth, blind us to many of the defects which lie "underneath, and are undermining the morality and strength "of the people." Or, take a more solemn utterance from one who has faced the pestilence in its worst form: "Such a visita- "tion as a cholera epidemic brings a torrent of deep questionings. "To be placed face to face with one of the great scourges of "man; to be enforced to confront, in mass and in detail, the "moral and physical evils which engender or increase epidemic "disease in our towns, is to be led into stern communings con- "cerning the whole of our social and political life. Why do "such evils, long known, exist? Why is so much energy, as "certainly exists in favour of all truly benevolent schemes, "dormant or misapplied? Does the moral and religious state "of our people keep pace with their greater physical advan- "tages? Are we not in danger of forgetting, in the midst of "boasted material and intellectual progress, that it is as cer-

"tainly true now as ever it was, that the largest part of the "misery among men depends at least on moral, not on material "causes? These and many other such questions rise in the "minds of Englishmen, when by social or political trial their "souls are stirred within them."—("Memoir of Cholera at "Oxford," p. 6, by H. W. Acland, M.D., F.R.S.) One more voice, as from the grave, may be added: "England may be "destined to spread a knowledge of sanitary science over the "globe, to set an example to other people of obedience to the "physical laws laid down by the Almighty, and in the words "of Milton's magnificent prose, 'to lead the nations in the way "of life.' But whether England herself have the wisdom to "walk in this way, and whether others follow or not therein, be "assured that in the observance of these immutable principles, "the permanent prosperity of States is bound up. As the "Scripture says, 'God is not mocked,' and His laws are not "broken with impunity."*

* Address by the late Sir Charles Hastings, M.D., *Transactions of* 1864.

IX.

REMEDIES.

It is when we come to speak of remedies that the difficulties rise to view.

Take, for instance, the single evil of overcrowding. "For "overcrowding, parishes pay week by week and year by year "far more than the entire rental of the property. It is thus "that these abominable houses are kept up—houses into "which healthy people may go, but out of which nothing but "disease and misery come" (R. Rawlinson, C.B.)—"Over-"crowding which impairs health and morals" (Sir George Strickland, Bart.)—"Overcrowding which renders all teaching "useless, until those to be taught are reasonably and decently "housed" (George Godwin, F.R.S., *Transactions of* 1864, p. 583). "People," says Dr. Hunter, "are not now alive to "tell us how children were brought up before this age of dense "agglomerations of poor began, and he would be a rash prophet "who should tell us what future behaviour is to be expected "from the present growth of children, who, under circumstances "probably never before paralleled in this country, are now "completing their education for future practice as 'dangerous "classes,' by sitting up half the night with persons of every "age, half naked, drunken, obscene, and quarrelsome."—(*Eighth Report on Public Health*, p. 56.)*

"Viewing the towns as a whole, the evil is probably greater in the present "day than at any previous time of our history. Upwards of two millions of the "population of our large towns are living in houses, or rather, I should say, "rooms and cellars, in which health, and with it capacity for labour, is well-"nigh physically impossible. These are the people whom no efforts can induce to "avail themselves of opportunities of instruction, even where that instruction is "gratuitously provided for them. It is from among their ranks that the squalid "army of one million paupers gains its recruits, and it is among their dwellings "that those diseases originate which, in the sickness and death they occasion, "entail a heavy penalty on society at large—kindling the flame from which the "sparks fly upwards, but where those sparks may alight, and how extended

* See Appendix, No. 7.

"may be the conflagration they will awaken, none can tell." "The last "twenty-five years have witnessed no general improvement, and there are as "yet no signs that the evil is remedying itself."—("Town Life among the Poorest," by J. E. Morgan, M.D., Paper read at British Medical Association Meeting, Oxford, August, 1868.)

Legislative remedies fail to reach this glaring evil. An experienced Medical Officer of Health asks, "We have at "present the power to regulate the number of people living in "one room; provided the persons are not of one family, the "law permits us to turn them out; but where are they to "go?* The people are already almost unable to get a "covering for their heads; and the remedy which the law "puts in our hands is simply to send them to the poor-house "or into the open air. The difficulty is so great, that in many "cases I have found that we held a power which we were "utterly unable to put into operation. With regard to the "suggestion that we should put dwelling-houses under the "same regulation as lodging-houses, I see great difficulty in "carrying that into effect. We find a natural jealousy on the "part of the people towards inspection, even in the lodging-"house department. To put the Act strictly in force, the "houses in that part of the town where the poorer classes "reside, would require to be under daily and weekly inspec-"tion. What we are called upon to do is to endeavour to "place the remedy within the reach of the people themselves, "by providing a better supply of cheap houses for the poor of "the population."

This opinion is supported by another authority, who says:

* When the same question was put elsewhere, the answer was, "We cannot "tell; we only know it will be destruction to themselves and others, if they "remain." Dr. Farr observes (*Thirtieth Report of Registrar-General*, p. 213): "It "is now as then a conflict of difficulties; for the question arises, Where can the "people live if you turn them out of cellars or garrets? and the alternative is in "appearance cruel. But as a healthy city of a limited number of inhabitants "enjoys life and fulfils the destiny of its race, while a crowded, suffering, "sickly, degenerated city of twice the population only drags on a wretched "existence in violation of the principles of life and the operations of nature, "laws against overcrowding must be rigorously enforced. A wise humanity "involving self-preservation is the law of every city."

"While we nurse a high-sounding and pretentious philan-
"thropy, we allow a state of things to exist that would
"disgrace a heathen clime. Men, women, and children are
"living a life of savages in the midst of civilized beings. To
"put the Acts of Parliament in force would be simply to chase
"the poor from place to place, and increase the hardships of
"their lot. District would war against district, and what one
"gained would be at the expense of another."—(*Social Science Papers of* 1865, p. 70.)

This objection was met at the time by the statement that the law had been acted upon in a neighbouring town with great and immediate beneficial effect on the public health; that although by the enforcement of such laws for the public preservation, a temporary evil was occasioned, yet that very temporary evil removes itself by the demand for temporary house accommodation which it causes; and that one great means of remedying the present evil of overcrowding would be by building cheap houses in the suburbs, and giving the labouring classes opportunity of extricating themselves from the crowded parts of our densely-populated towns.

But for this purpose land must be obtained, and land in the neighbourhood of towns is not generally to be had for such objects, except at a monopoly price, and often is not to be had at any price. Hemmed in in places by large landed properties, the towns have not always the means of expansion afforded them. (*Transactions*, 1864, p. 586.)* We are, accordingly,

* The Registrar-General opens the same cause of difficulty as respects the towns themselves in the *Thirtieth Annual Report*, p. 219. "Do not leave the "dirt in rookeries, in pits, in dunghills. What are municipal bodies, town "councils, aldermen, mayors, provosts good for, if they cannot by administra-"tive measures displace rookeries by healthy habitations, and supply the people "with water, and with the means of cleanliness? If we ascend from zymotic "disease to its generating element, and from this to bad dwellings, bad habits, "and bad municipal organization, causes are often found lying beyond in bad "laws. A city becomes the seat of trade and manufactures, in which many "workmen from the country are required; families are brought together, and "are crowded in existing houses; and it is found impossible to extend the house "accommodation by building new houses, on account of existing land tenures. "The owners, whether corporations or individuals, hold on limited tenures, "and as they cannot sell the freehold, or grant leases for long terms of years,

told by another authority, in the course of the same discussion, that the remedy must be a national one, and that Government must either find better accommodation for these people, or they must find land where cottages and suburban villages can be erected. Minor remedies glanced at by the speakers, such as calling private benevolence into play or additional encouragement to Building Societies, are declared to be but drops in the ocean. Even with regard to private benevolence, its powerlessness is shown by another practical authority, elsewhere,—"We have every kind of liberty but the right one. "We have liberty to protect, even at the expense of many "deaths and large taxation, that which is called vested "interest; but liberty to proceed the straightest way to any "great good, we can as yet be scarcely said to have. In a "deputation to Mr. Peabody and his trustees, which I attended, "we urged, Why not purchase small plots, the worst in "London, a court or alley here and there, and show us how to "build cheaply, and in a manner that shall be at once both "paying and healthy, so that we, in all the worst parts of "London, seeing that it would not be a losing scheme, might "everywhere imitate you? And the answer was, so far as I "can recollect, 'There is much complication and many "'interests; nothing but compulsory action could deal with "'it. We cannot buy as it is, and we cannot get an Act to "'enable us to purchase these places.' And yet something "of this sort appears to be our only remedy for our scarce and "filthy and expensive habitations for the poorer people."—("Fever in London," by W. Rendle, *Journal of Social Science*, 1866.) One remedy, indeed, has been suggested in behalf of those who most need protection, but legislation has not yet reached that point, namely, "no house should be allowed to be "inhabited unless it be provided with appliances of cleanliness." "We want the persons who let their houses to do what once

"the land is unavailable for building purposes. Houses are not built to meet "the demand, and the want of decent dwellings is inevitable. To abolish all "the rookeries is possible now, with free and cheap locomotion, if the law give "facilities to the acquisition of that necessity of healthy life, sites for dwelling-"houses. A bad land tenure is a cause of death."

"I- mentioned in a Committee of the House of Lords, but "which was not received with great favour. I said I would "render it illegal to let a house without good drainage, and a "good supply of water, and that an Act passed in that way "would settle the whole question."—(*Minutes of Evidence*, 1869, *Royal Commission on Water Supply*, p. 271.) "I would "not let human beings be living, as considerable sections of "the community have been shown to live, in conditions not "desirable for swine. People ought not to be allowed to let "for hire places which they are now allowed to let. If houses "not wholesome were shut out of the market, decent houses "would be supplied."—(Mr. Simon, *Evidence*, *Royal Sanitary Commission*, 1869.)

It was hoped that the communities would take action under the 35th and other sections of the Sanitary Act of 1866 to remedy the evils from which they chiefly suffered; but we are told on good authority (*Transactions of* 1868, p. 462) that very few even of the Metropolitan Local Boards have availed themselves of its provisions. Legal facilities for the purchase of land were granted under the Labouring Classes Dwellings' Act of 1866 to Local Boards and Voluntary Associations, but the Act is said to be almost inoperative.—(Address "On Health," by H. W. Rumsey, M.D., 1868.) Much was hoped from the promised Artizans' and Labourers' Dwellings' Act of the Session of 1868, "a well-meant but hitherto almost inoperative "method of substituting healthy houses for the fever nests of "closely packed towns," but beyond establishing the important principle, "that the owner of property unfit for human "habitation has no right to obtain rent from it" (*Evidence*, *Royal Sanitary Commission*, 1869, p. 131), its cumbrousness will probably render it a dead letter. It is plain that in this, as in the other enactments, a motive power is wanting to put them into operation. The Labourers' Dwellings' Act of 1855 was not found by Dr. Hunter anywhere in operation (*Eighth Report Public Health*, p. 62); and the older Labouring Classes Lodging House Act of 1851, "an admirable measure," intended for municipal action, has been left to the public spirit of a few capitalists (*Idem*, p. 94), one place, Huddersfield, excepted.

Municipal and local, rather than Government action, is the boast of England.* "We enervate people, by taking their "proper work and doing it for them." But a limit is imposed on this otherwise sound principle by considerations of the national health. In a recent Parliamentary inquiry (*Minutes of Evidence*, *Royal Commission on Water Supply*, 1869, p. 80), a competent witness was asked, "Do you not think it right "that municipalities should spend as they please their own "money?" And the answer was, "Still there ought to be a "controlling influence over them to see that their money was "spent properly, especially when the health of the different "populations is brought to bear." The question expresses the consideration which appears to lie at the root of all permissive sanitary legislation, and it is fully met by the reply. The towns, having, in the year 1858, insisted on the uncontrolled sanitary direction of their affairs, must, for the national interests, be held to have accepted, along with the weighty responsibilities of the trust, the pecuniary obligations connected with it, and are no longer in a position, as regards the health of their communities, to act or not to act as they think proper.

If these are the difficulties in the way of a single branch of sanitary reform, what will be done for the ever-increasing pure-water wants of the country? What for the proper refuse-removal of cities and towns? "Misled and dazzled by "our gigantic improvements, are we not neglecting the condition "of those who form a vital part of the life of the nation? "Is not our civilization crushing down those who have least "power to help themselves? Does not the rapid growth of "our commercial system, our achievements in the arts, and "the marvellous increase in wealth, blind us to many of the "defects which lie underneath, and are undermining the "morality and strength of the people?" These are solemn questions, and they require deep national heart-searchings for their answer.

* See Appendix, No. 8.

APPENDIX.

NOTE No. 1, p. 8.—ON SINGLE-ROOM TENEMENTS.

Dr. Hunter (Vol. 8, *Public Health Report*, p. 56) states the result of this great change to be that the old close-packed little towns are now centres built round on every side, open nowhere to air, and being no longer agreeable to the rich, are abandoned by them for the pleasanter outskirts. The successors of these rich are occupying the larger houses at the rate of a family to each room, and a population, for which the houses were not intended and quite unfit, has been created, whose surroundings are truly degrading to the adults and ruinous to the children. He proceeds to observe (p. 62): "It is chiefly in towns of single-"room lettings that fixed rules are needed to be applied, and that the law, when "adopted, proves insufficient for relief in the bulk of the instances. In parts "of London and some of the towns the state of the single-roomed tenements is "sickening; the state of the people most pitiable. It is not too much to say "that life in parts of London and Newcastle is infernal; and as our countrymen "are probably much the same everywhere, the cause of the evil must be sought "in the surroundings. Analysis of what these are, and rejection of those "which, though commonly injurious, are common to all towns, reduce the "matter to the single-room tenements, and these are firmly believed to be the "cause of the disease and wickedness which prevail where they are found. "Both on account of their own unfitness, and of their tendency to encourage "and protect overcrowding, these houses, not numerous in proportion to the "whole country, but of deadly injuriousness wherever they exist, call for "extended and exact legislation, and a vigorous and independent spirit of "administration in the places cursed by their presence."

These shiftings of population, more rapid and extensive than any other country has witnessed during the same period, have plunged the towns into very great difficulties.

NOTE No. 2, p. 12.—ON TYPHOID.

"Typhoid, enteric, or bowel fever is the most deadly of all forms of continued fever" (Professor Christison, *Transactions*, 1863), and it has been pronounced to be the most easily preventable (Dr. Lankester.)

"These cases illustrate perfectly, but without any trace of exaggeration, the "circumstances under which alone typhoid fever is empowered annually to kill "so many thousands of our population, and to prostrate for months at a time "so many scores of other thousands. Nor is this all. When cholera from time "to time is among us, and its victims during the short while of its prevalence, "are counted in quick succeeding thousands, like the slain and wounded of great "battles, the circumstances of that pestilence are the same. The laws of its "contagion in this country are substantially the laws of the fever contagion; "always there is the one story of filth; excrement-sodden earth, excrement-"reeking air, excrement-tainted water, these are for us the causes of cholera."—(*Ninth Report of Medical Officer of the Privy Council*, 1867, p. 33.)

Nine years before the date of this Report, the Medical Officer had written (*Report, General Board of Health*, 1858): "There are certain diseases of which "it is hardly a metaphor to say that they consist in the extension of a putrefac-"tive process from matters outside the body to matters inside the body; "diseases, of which the very essence is filth; diseases which have no "local habitation, except where putrefiable air or putrefiable water "furnishes means for their rise or propagation; diseases, against which "there may be found a complete security in the cultivation of public and "private cleanliness. Yet some tens of thousands of deaths annually arise "in England from these diseases. And again, there are diseases of other "kinds which annually kill some thousands more of our population, though the "appointed preventatives are so definite and so accessible that scarcely a death "from such causes ought to occur in any civilized country. To these diseases, "so entirely preventable, and to the preventable proportion of those other "diseases, is referred at least a quarter of the mortality of England."

Eight years ago the annually recurring cases of typhus and typhoid were estimated by Dr. Farr (*Twenty-fifth Annual Report*, p. 177) at 152,000, of which 18,000 died, each case implying about a month's sickness. The period of convalescence is extended by Dr. Anstie in severe cases to not less than three or four months ("Notes on Epidemics," p. 90), before the patient can be considered as fit for work. In 1864 the cases had risen to 165,400 (*Twenty-seventh Annual Report*, p. 191), and the deaths to 20,000, "young men and women in the prime of life being chiefly attacked." This mass of life and working power, subducted from the country's capital, appeals to reason and humanity for a remedy. The typhoidal character of infantile remittent fever has been noticed by Dr. Farr (*Twenty-sixth Annual Report*, p. 183) as one of the causes of their "murderous mortality." "Local Boards of Health, provided the water supply "be not impure, can virtually guarantee urban populations against epidemics "of typhoid fever, diarrhœa and cholera."—(Mr. Simon, *Report Public Health*, 1858, p. 20.)

NOTE No. 3, p. 34.—ON THE HOUSING OF THE POOR IN TOWNS.

The evidence collected by the Royal Commissioners in their several inquiries of late years is full of the miserable condition of what may be called cottage

property in towns, and of what its occupants have to endure. "The worst class "of cottage property pays the most, and the cellar dwellings are the most "profitable of any. Opposition to all improvement comes from the owners of "such property, not from the working classes, and the parish, and through the "parish the public is mulcted for this state of things."—(*Evidence, Royal Commission*, 1867, Leeds, p. 319.) Dr. Hunter observes (*Eighth Report on Public Health*, p. 58), "Cellars and bed-rooms dug out of a soil differing very little "from the contents of an ash-midden, are represented (at least in Leeds and "Bradford) to be increasing in number. It will be found, on reference to the "local reports, that the cellar is not a cheap residence in which it would be "cruel to disturb the miserable poor." The same takes place outside the towns. "It is a common thing to find small tradesmen build a lot of cottages "perfectly regardless of all sanitary essentials. Many such cottages are now "paying 25 or 30 per cent. upon what they may have cost. That ought "scarcely to be permitted."—(*Evidence, Royal Sanitary Commission*, p. 382.) Complaints are apt to be visited with eviction. "Tenants are sometimes summarily ejected when suspected of setting a bad example by complaints against "their accommodation, and this acts to deter sanitary reformers in London "from interfering where they have no power of redress."—(*Eighth Report*, p. 95.)

Note No. 4, p. 34.—On Private Slaughter-houses in Towns.

Private slaughter-houses, into the interior of which a peep has been afforded by Dr. Thudichum at p. 466, *Seventh Report Public Health*, and in pp. 520 and 559, *Transactions of* 1863, are still barbarously allowed to maintain their ground in the midst of, and in close contiguity to, town dwellings, polluting the drains and filling them with vermin. In the *Minutes of Evidence of the Royal Sanitary Commission*, 1869, p. 124, a witness states: "As to slaughter-houses, there is a "good deal of complaint that our legislation requires amendment. We tried "and succeeded in the House of Commons in getting a bill to abolish altogether slaughtering in the town; but I am sorry to say that we were "defeated in the House of Lords two years ago. We had made admirable "arrangements, as we thought, for one slaughter-house outside the town "altogether. We brought a very large mass of evidence from Brussels and "Paris, Edinburgh and Glasgow, and, after a fight of five or six days in the "House of Commons, we succeeded in getting our bill against both the "butchers and the slaughter-house proprietors and the Local Board; but in "the House of Lords we failed, although we had only one opponent there. I "could not tell the reason why we failed."

No private slaughter-houses are allowed in Birkenhead, Edinburgh, Greenock, Newport, and Paisley. (Dr. A. P. Stewart, *Transactions of* 1866, p. 540.) The advantages to all classes, including the butchers themselves, derived from properly constructed and cleanly kept *abattoirs*, have been set forth in some detail, in the instance of Leith, in the *Transactions of* 1863, p. 491.

Note No. 5, p. 36.

On the subject of the suppression of facts supposed to be injurious to local interests, the Medical Officer of the Privy Council observes (*Evidence, Royal Sanitary Commission*, 1869, p. 107): "There are localities that are interested in "suppressing the fact that they have got attacks of disease. Sometimes they "do not like to be overhauled from the centre with reference to their shortcomings, and at other times they are afraid of having visitors frightened "away, and so forth; and registrars are given to understand that they must "not communicate awkward facts. A complete system of inspection would do "a great deal to obviate concealments of that kind, but the law ought to make "the concealment an offence. The communication of such facts should be "obligatory."

Note No. 6, p. 37.

These death-rates are probably not intended by the Registrar-General to be received otherwise than as an approximation to the reality. It was observed by Dr. Farr, when speaking of the prevalence of diarrhœa and typhoid in Birmingham, in connection with the large use of its well water (*Transactions of* 1868, p. 502), "I may here mention that the mortality of a large "portion of Birmingham is very high. It is not 24 per 1,000 but 27 per 1,000 "in the old borough, though it is reduced by taking in Aston, where the mortality is 21 per 1,000. In King's Norton, including Edgbaston, it is only 17 "per 1,000. If, therefore, you mix these elements together to get the municipal "borough, you obtain a comparatively low rate of mortality, but if, on the "contrary, you take Birmingham proper, where the great mass of the population reside, you get a very high rate of mortality." The same observation applies to Bristol also. Bristol proper, which, as an old seaport city in a low and confined locality, labours under many serious disadvantages in comparison with Birmingham, is presented to view in No. 339 of the Annual Reports of the Registrar-General, as comprising 66,027 inhabitants on an area of 1,840 acres, out of a population of 170,000, on a municipal area of 4,609 acres. This limited field of the city proper presents a much higher death-rate than that of the municipal boundary, and has a death-rate of 29 per 1,000 for the decennial period of 1841-50, and of 28 per 1,000 for the period 1851-60, after the corrections noted in p. 50 of the Preface of the *Supplement to the Twenty-fifth Annual Report*. The average rate for the whole municipal area is reduced in ordinary seasons by taking in the much lower mortality of the higher and healthier portions. The same observation is still more applicable to London, which "is not one city, but a *congeries* of cities and towns," spread over 122 square miles to the North and South of the Thames, from Hampstead to Lewisham, with death-rates varying in its several districts from 17 to 29 per 1,000, and containing "plague spots which present as great a mortality as that "to be found in any other town throughout the country" (Dr. Lankester); and Dr. Hunter, in the *Eighth Report on Public Health*, p. 89, states, "There are "about 20 large colonies in London of about 10,000 persons each, whose miser-

"able condition exceeded almost anything he had seen elsewhere in England, "the result, almost entirely, of their bad house accommodation, which is much "worse than was the case 20 years ago." These dark spots, unhappily, disappear from view amongst the 3,200,000 population of its large area of 80,000 acres. The mortality both of London and Birmingham has lately been pronounced to be much under-rated (Dr. Farr, *Evidence, Royal Sanitary Commission*, p. 284), and that of Bristol is liable to very great and sudden fluctuation. Scarcely had the eulogiums of the press been uttered at the time of the meeting of the Social Conference there in the past year when the death scale flew up, attaining at times the highest point of any, and it has continued ever since at a high figure. Still, on a general survey, Bristol, which in the *Second Report of the Commissioners of Inquiry*, 1845, p. 75, stood at that period the third highest in the scale of unhealthiness in England, contrasts very favourably with other towns of the same character now; and it would be an interesting field of inquiry to trace the precise causes of the difference, the fullest allowance being at the same time made for the sanitary improvements described in pp. 58-70, *Ninth Report Public Health*, 1867, and for the persistent efforts of its sanitary staff.

It appears from the same evidence, p. 244, that the municipal boundaries have been accepted by the Registrar-General for the fourteen large towns on their application to that effect, instead of their Registration districts, as the area of their mortality returns. If the same rule were made applicable to the other 580 towns of the Census List of 1861, many towns now hidden or hiding behind the Registration district death-rate, "where scarcely rudimentary endeavours have "been made to attain the first essential objects of a good sanitary standard, and "where there is at present little more structural arrangement for the removal of "the refuse than if the inhabitants were but tented there for a night" (Vol. 9, *Report Public Health*, p. 34), would stand out in their true colours.

The mortality of the seventeen large towns, as exhibited at present in the weekly returns, tells most against Liverpool and Manchester, which have doubly the densest population of any in England and Wales in proportion to their areas, and most in favour of Leeds and Sheffield, where the areas of the mortality returns are exceptionally large. The Registrar-General, in the *Supplement to the Twenty-fifth Annual Report*, announces a constant relation between the density of the population and the mortality. It follows that the death-rates of the large towns are devoid of intrinsic value, as a ground of comparison, unless due advertence be had to these modifying causes.

The Medical Officer of the Privy Council, in p. 13 of the Ninth Report on Public Health, pronounces a comparison of general death-rates to be a rough-and-ready, but fairly trustworthy comparison of degrees of health, subject to the conditions and cautions noted by him. But with regard to local rates of mortality, a protest was made by Dr. Rumsey in a paper read at the Birmingham Conference against the inconsiderate use, and sometimes the audacious misuse, of local rates of mortality, in support of some favourite sanitary measure, or in opposition to some dreaded reform, by those who may not yet have proved the fallacies of sanitary statistics; or who do not perceive how small may be the bearing of any particular act or neglect upon the variations of a general death-rate; or, again, who forget that the same figures in different places, in populations differing as to age, class, and occupation, may represent

totally different standards of health, vigour, and longevity. The evidence taken by the Royal Sanitary Commission of 1869 brings clearly out the fact from individual instances, that too much stress has been laid throughout the country on death-rates alone, and that a low local death-rate is compatible with the existence of causes calculated to produce a permanent deterioration of the health of the people in those localities.

Note No. 7, p. 50.

The extract from Dr. Hunter's Report has reference to the young. A darker and still more terrible picture is unveiled, as regard adults, in Dr. Gairdner's work "On Public Health," 1862, pp. 264-268, amongst other authorities that might be cited, exhibiting "the extreme degree of demoralization inevitably "consequent on the dehumanized state of families and individuals brought up "amongst these crowded dens, in the very midst of our most advanced civiliza-"tion." The degrading conditions of life from the same cause in country as well as town have been the subject of the gravest comment in the Public Health Reports, p. 13, *Seventh Report*, and p. 14, *Eighth Report*, as conveying a reproach to the civilization of England.

Note 8, p. 55.

"Municipal government depends for its value upon the way it is adminis-"tered."—(J. Hole.) "An opportunity now offers itself for appealing to the "public against that supineness which, fostered by a habit of overweening "confidence in our powers of local self-government, has induced Englishmen to "neglect problems which are daily becoming of more and more vital conse-"quence to the well-being of the State."—(Austin.) Nor have they been more successful in their internal local legislation. The General Board of Health, in their Report of 1854, p. 42, state that the Public Health Act of 1848 was designed for general application, but "the delay in providing the supplementary "powers requisite for the accomplishment of some of its minor objects was "taken advantage of by interested parties to multiply Local Acts, at a vast and "useless cost to the community, and so to frame them as to defeat the securities "and objects intended by the Public Health Act;" the result being that the local laws have got into such a mass of confusion in some places, "that nobody "can make head or tail of them" (*Evidence Royal Sanitary Commission*, 1869, p. 129), "and that any codification of this multiplicity of Acts would be already "a work of very great labour, and is not attempted in consequence." (*Idem*, p. 131.)

In the towns thus permitted to become a law to themselves, the Public Health Acts have no currency?—(*Ibid.*) A body of bye-laws, besides, has grown up under Section 34 of the Local Government Act of 1858, which have gone altogether beyond the province of a bye-law, which has for its object something in a particular locality not remediable by the general law, and even beyond the

law itself (*Ibid.*, pp. 80, 81); and influences were brought to bear upon the representatives to get the bye-laws so framed as to interfere to the smallest possible extent with the rights and privileges of individuals (*Idem*, p. 215). In many instances the Local Government Act was adopted by small communities for the sole purpose of evading other Acts, until a stop had to be put by law to the practice (*Ibid.*, p. 56).

Even in respect to the vitally important matter of overcrowding in common lodging-houses and tenement dwellings, "the evils of which have been pro-"nounced to be of such gigantic magnitude as to neutralize whatever in other "respects was being attempted for the improvement of the public health" (*Eighth Report Public Health*, p. 14), it has been shown by Dr. Hunter (*Ibid.*, pp. 51-62) that the utmost difference prevails in places as to the interpretation and application of the words, and the administration of the local laws as they stand, and this discrepancy holds to such an extent as to render the General Nuisance Acts practically inoperative.

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THE CONTAGIOUS DISEASES ACTS

AND

THE CONTAGIOUS DISEASES PREVENTIVE BILL:

BY

ANTHROPOS.

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356, STRAND
LONDON.

—

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THE

CONTAGIOUS DISEASES ACTS.

The nature of the Acts with which this pamphlet is concerned is too well known to require any detailed explanation. It is sufficient to say that they were passed to provide for the medical treatment of females who practise prostitution as a regular calling, and who, on compulsory examination at stated intervals, are found to be affected by venereal disease. The restoration to health of the prostitute, however, is merely the immediate aim of the Contagious Diseases Acts. This result, however praiseworthy according to the showing of many of their opponents, was only incidental to the attainment of the ultimate object which originated that legislation.

The policy which directed it in the first instance was, says Mr. Massey, the Chairman of the late Royal Commission, "a desire to maintain the health of soldiers and sailors, whose physical efficiency was reported to be very seriously affected by the disease which they contracted at garrison and seaport towns, those towns and garrisons being the resort, in a peculiar manner, of common prostitutes." (*Ques.* 19,993.) According to the Report of the Commission, it was considered that that result could be attained "without recognizing incontinence as an unavoidable evil, or prostitution as a consequent necessity." Mr. Mill, who gave evidence in opposition to the Acts, very fairly admitted their object to be as stated by Mr. Massey, and he referred to another aim which their promoters had in view, although originally it could have occupied only a subsidiary position, namely, to protect the innocent from having venereal diseases communicated to them. (*Ques.* 20,002.) He admits, moreover, that the Acts were not designed "to protect those who voluntarily seek indulgence," and thus supplies a sufficient answer to those who oppose them on the ground that their purpose is "to give security to the soldiers in the committal of fornication." (*Ques.* 12,429).

Various other motives have been assigned for the passing of the Contagious Diseases Acts, but examination would show that in these cases their effects, or supposed effects, have been confounded with their aim. It is necessary to make this dis-

tinction, since the opposition to the Acts has nothing to do with their object, and is really founded on certain practical or theoretical consequences which are thought to ensue from them. The most bigoted religionist will hardly deny that it is the duty of the State to protect the health of its soldiers and sailors, and to cure them when they are sick, or that the treatment of the diseases, to which the unfortunate women who derive a livelihood from prostitution are especially liable, is a legitimate and proper mode of exercising charity. This may be quite admitted, and even that the Acts have completely answered their purpose, and yet they may be opposed without any inconsistency. It may be, and it is in fact, objected that however proper may be the supplying a protection from venereal disease and its effects, this ought not to be obtained or sought for by the mode provided by the Contagious Diseases Acts, the carrying out of which is attended by more serious evils than those which they are intended to cure. This is the only ground, speaking broadly, which would justify the repeal of the Acts, assuming that they have had the actual beneficial result intended.

It is evident, nevertheless, that if the Contagious Diseases Acts have failed in their effect, the opposition to them would gain much in weight; and, before considering the arguments of their opponents founded on the evils which are said to result from their operation, it is advisable to consider how far this has been positively beneficial. The Acts having been passed with the object of reducing the amount of venereal disease among the men belonging to the military and naval services, the attainment of this result or otherwise is a test of their success or failure. Now on this question the evidence taken before the late Commission is decisive. It is true that, for some reason or other not yet ascertained, the slighter form of disease would seem to have somewhat increased rather than to have diminished since the Acts came into operation. This is, however, a matter of slight importance, since, as Dr. Balfour remarks, that form of disease would not of itself "justify any expense, or the infliction of anything that might be called a hardship." (*Ques.* 16,145.)

It is by their effect on the more serious form of disease, syphilis, that the success or otherwise of the Acts must be tested. I shall not give any statistics on this point, since they are treated by the members of the late Commission as not in themselves conclusive. It will be better to give the opinion which they formed after considering the numerous statistics

with which they were furnished, and after hearing the evidence of those best fitted to judge in such a matter. They say, "So far as the army and navy are concerned, the evidence before us appears to testify to a general impression, on the part of the medical officers of both services, that the Acts have operated beneficially on the health of the men. A striking proof of this is contained in the evidence of Dr. Balfour, who has been induced by further experience to change his view entirely as to the probable success of the present Acts in repressing the disease against which they were chiefly directed, namely, constitutional syphilis. Dr. Balfour, who dissented strongly from the recommendations of the Medical Committee in 1868, especially with reference to periodical examinations, now testifies that the working of the Acts has been 'decidedly beneficial,' and that the periodical examination of women is in his opinion an essential part of them. The same general inference may be drawn from the fact that among the witnesses summoned at the instance of the Association for the Repeal of the Acts, there was no medical officer of either service." (*Report* i. p. 11.) It is true that, while admitting the fact of a decrease in the number of cases of syphilis in the protected districts, some of the opponents of the Act seek to account for it by the operation of other causes. The conclusive answer to this objection is to be found, however, in the further fact that in the unprotected districts the number of such cases treated during the same period, not only did not decrease, but actually increased. Thus, they advanced from 108.6 per 1000 men in 1864 to 113.3 in 1870, a number which is more than twice as great as that of the cases (54.5) in the districts under the Acts. These had only 54.5 cases per thousand men in the latter year as against 120 per thousand in 1864. (Table A, *Report* ii. p. 811.)

It is, nevertheless, very probable that other causes besides periodical examination of the women leading a life of prostitution and treatment of the diseases to which they are especially liable, may have aided in securing this result. It is probable that the liability to contract the severer form of venereal disease, as well as the degree in which it developes itself, depends in no slight measure on the general health and habits of the person attacked. Hence, if the Contagious Diseases Acts have led to the improvement of these conditions, their advocates are justified in citing the fact as some proof of their success. Now, what is the evidence on this point furnished by the Report of the late Commission? After re-

ferring to the supposed substitution in the protected districts of clandestine prostitution for public solicitation, the Report proceeds: "The absence of public solicitation is a material gain to public decency and morality. It is hardly disputed that a sensible improvement has been observed in the streets in the conduct and demeanour of the women since the Acts came into operation. Soldiers and sailors, under the influence of drink, are no longer importuned and seized upon by filthy prostitutes, as they were in former days. It is true that this ameliorated state of things is attributable in some degree to causes independent of the Acts for prevention of contagious diseases. The manners and habits of the people have become generally much more decorous and wholesome during the last generation, and this improvement has reached even the degraded classes of society. It is not improbable that the venereal contagion, like other diseases which are partly engendered and always aggravated by neglect of cleanliness, has been on the decline of late years. The various sanitary regulations which have been enforced, and the increased activity of the police in modern times, have all tended to improve the public health. The Contagious Diseases Acts, however, have both directly and indirectly promoted the objects of sanitary and municipal police. They have purged the towns and encampments to which they have been applied of miserable creatures who were masses of rottenness and vehicles of disease, and provided them with asylums where their sufferings could be temporarily relieved, even if their malady was beyond cure, and where their better nature was probably for the first time touched by human sympathy." (i. p. 11.) We shall see that the Acts are, on the other hand, accused of certain deteriorating effects over the character of the women subject to them. This accusation will be considered hereafter; but that the improvements asserted to have taken place in the condition and habits of the women, are really due to the operation of the Acts themselves, rather than to any general improvement in the manners of the age, is evident from the fact that they are not observable in anything like the same degree in unprotected districts.

We thus see that besides the attainment of the direct object of the Contagious Diseases Acts, and the consequent benefit derived from them by the improvement in the bodily health of the women brought under them, their operation is accompanied by various indirect beneficial results. Their operation has, however, led to other results of a still more

important character than those already mentioned. Thus it is impossible to disprove the fact insisted on by many witnesses that the number of public women has very considerably decreased within the protected areas. The evidence furnished by the police returns (*Appendix* B, pp. 778-785) is conclusive on this point, notwithstanding the doubts which have been expressed in relation to the Devonport district. It cannot be denied that many of the women removed from the register in the protected districts go elsewhere to follow their calling. Such is the case with nearly three-fifths of the women thus dealt with. But of the remaining two-fifths, notwithstanding the wild statements which have been made that the Acts tend to increase prostitution, and to hinder the restoration to a life of virtue those who follow this calling, a very large proportion indeed are absolutely reclaimed. The returns show that during the year 1870, out of a total number of 2,739 women removed from the register, no less than 730 were restored to their friends, 244 entered Homes, and 157 were married, leaving 50 to be accounted for by death. During the whole period in which the Acts have been carried out in the several districts which have at different periods become subject to them, out of 7,038 women removed from the register, 1,866 have been restored to their friends, 634 have entered Homes, and 490 have married, while 148 have died, showing much the same proportion in each class as during the single year 1870. It is, of course, by no means certain that none of the women who are thus reclaimed do not return to their former mode of life, and some of them are in fact known to do so. The proportion is, however, probably small, and on the other hand there is reason to believe that many of those who are removed from the register owing to their having left the district forsake a life of prostitution. The inspector of police who superintends the operation of the Acts at Devonport asserts that, of the whole number of women removed from the register for every cause, upwards of 90 per cent. are reclaimed, only 10 per cent. continuing or returning to a life of prostitution. (*Ques.* 973.)

The Report of the late Commission, referring to the reduction of the number of prostitutes, and to the fact that this result at Devonport involved the total disappearance from the streets of some 200 or 300 children of from 13 to 15 years of age, affirms that "if such results have been attained either wholly or partially through the operation of the Acts, those who demand their absolute repeal are bound to show that

they have produced evils to counterbalance the good, which, after all reasonable deductions have been made, may be fairly attributed to them." (i. p. 12.) One of the most important results, and that on which the great decrease in the number of prostitutes doubtless mainly depends, is the deterrent effect which the Acts exert. The Commissioners whose Report will be often referred to in these pages say that they "have been assured by witnesses who spoke from personal knowledge, that not only young girls but married women, seamstresses, and others, were restrained from indulging in occasional license from fear of the Acts." (p. 12.) And the facts prove that this must be the case, since, as there is a continual flux and reflux of prostitutes in every district, and yet the places of those year by year taken off the register are not again fully filled up, there must be a deficiency in the supply which can only be attributed to the influence of the Acts.

The good which the Contagious Diseases Acts have been the instrument of effecting is undoubtedly immense, and the evils occasioned by them must be proportionably great to counterbalance their numerous benefits and furnish a sufficient reason for their repeal. To judge from the extraordinary language of the opponents of the Acts, it might be supposed that the former is utterly insignificant as compared with the latter; if, indeed, the Acts can be said to have conferred any benefits whatever. Such a notion as this will alone account for the conduct of those members of the Anti-Contagious Diseases Acts Associations who have spent so much time in travelling about the country agitating for repeal, and urging prostitutes to resist to the utmost the application of the Acts. The feeling, at least, on the point must be strong indeed to lead Mrs. Butler to utter such language in connection with them as, "The elevation of impure and unlawful intercourse, to the dignity of a recognized traffic under legal regulations, exercises a most baneful influence on the community. When through the base treachery of a base law, a law grounded on a supposed necessity of impunity, the conscience of a people becomes dimmed and darkened, the foundations of virtue are undermined, the generations to come cease to discern clearly between good and evil, self-control is abandoned, and vice is increased." (*Ques.* 12,869.) It is not surprising that Mr. Massey had to ask Mrs. Butler to descend from this moral elevation, but, extreme as her language is, it proves that in the minds of those who have joined her in the crusade against the Contagious Diseases Acts there are objections to

them which furnish overwhelming grounds for their unconditional repeal. I propose, therefore, now to consider these objections, and to ascertain what influence they ought to exert over the course of legislation on the subject in hand.

The Report of the late Commission enumerates the chief points raised by the opponents of the Contagious Diseases Acts, and a perusal of the evidence given before the Lords and Commons Committees, and of various publications bearing on the subject, shows that the enumeration is correct. I cannot do better, therefore, than give the official summary of objections before considering them in detail. It runs as follows:

1—That the Acts are designed to provide sound prostitutes for soldiers and sailors, and that this is implied in their title.

2—That such legislation, by rendering vicious indulgence less hazardous, has a direct tendency to promote immorality.

3—That the protected districts are in fact resorted to by libertines, and that married men and youths are induced to visit the registered women by the security they are supposed to offer of freedom from contagion.

4—That the practice of registering prostitutes, and subjecting them to a periodical examination for the purpose of ascertaining whether they are in a fit condition to follow their trade, is in itself an outrage upon public decency and morality.

5—That such a system is virtually a recognition by the State of the trade of prostitution.

6—That the compulsory surgical examination of the women at stated intervals, is calculated to remove any lingering sense of shame in the subjects of such operation, and to harden them.

7—That the increased gains of prostitution consequent upon the improved condition of the women offer a temptation to girls to enter upon this way of life.

8—That it is unfair to exempt men from the restraints and regulations to which women are subjected.

9—That the acts are opposed to the principles of constitutional law.

Under the last head may be included, not only the objection that detention in hospital is an interference with the

liberty of the subject, but also the wider ground of opposition often urged that prostitutes are entitled to the protection of the law, and that the liability to compulsory examination is a grievous wrong. So also under the 8th objection may be brought that advanced by *Justina*, that the Contagious Diseases Acts are proofs of the social subjection of women, a statement, however, which can hardly be accepted as a serious argument against them.

The summarizing of the objections urged shews more clearly than would otherwise be possible their nature, and it reveals how strongly the moral aspect of the question influences the judgment of those who desire the repeal of the Acts. In fact, the only objections which have no connection with the moral question are derived from the supposed opposition of the Acts to the principles of constitutional law, and that which treats them as a hardship especially inflicted on woman. It will be well to get rid of these objections before considering the more important points that have been raised, and which it can hardly be doubted have influenced most of the opposition which has been aroused against the Contagious Diseases Acts. Mr. Mill, indeed, places more stress on the supposed infringement of the liberty of the subject, than on any other point. (*Ques.* 19,994.) A great part of his objection, however, turns on the possibility of a modest woman being brought up under the Acts, and the less chance there is of this taking place the weaker it becomes. The Chairman of the late Commission told Mr. Mill that they were satisfied that no practical abuse of the Act by the police had taken place (*Ques.* 19,995), and hence Mr. Mill's position is limited to the impropriety of taking away the security of personal liberty from the women belonging to the class of prostitutes. He sees no objection to hospitals being provided for the care of patients, but he is opposed to persons being consigned to them against their will. (*Ques.* 19,999.) But it is evident that the principle which governs his opinion applies equally well to all contagious diseases, and that according to it compulsory detention in hospital of a person suffering from small pox is also an invasion of the rights of the subject. There is another point of agreement besides confinement in hospital between state-dealing with small pox and that with venereal diseases. The cure of small pox is a subsidiary matter, the most important being its prevention by vaccination, the performance of which the State enforces by certain penalties. In the same way, although the cure of venereal diseases

is the ultimate object in view, yet the most important matter in connection with the Contagious Diseases Acts is the periodical examination, "which all the medical witnesses engaged in the administration of the Acts concur in representing as essential to their efficiency." (*Rep.* i. p. 13.) The infliction of a penalty for refusing to submit to examination is no greater hardship on women leading a life of prostitution than is the punishment of those who refuse to have their children vaccinated. The mere fact that the women examined may possibly not be diseased is of no importance in this relation. It by no means follows that a child if unvaccinated will have the small pox in infancy or later in life. In either case the possibility of contracting a contagious and highly destructive disease is the ground for requiring the application of a general rule. Mr. Mill would possibly make a distinction between venereal and other contagious diseases, founded on the opinion that it is not "part of the business of the Government to provide securities beforehand against the consequences of immorality of any kind." (*Ques.* 19,999.) It is evident, indeed, that the question of morality has strongly influenced Mr. Mill's opinion as to the propriety of the Contagious Diseases Acts. Thus, he says that the detention under the Acts is always liable to the objection that it facilitates an immoral purpose, even if it is not liable to others. (*Ques.* 20,005.) The last remark made by Mr. Mill was that the tendency of the Acts is to do moral injury, because it is hardly possible "for thoughtless people not to infer, when special precautions are taken to make a course which is generally considered worthy of disapprobation safer than it would naturally be, that it cannot be considered very bad by the law, and possibly may be considered as either not bad at all, or at any rate a necessary evil." (*Ques.* 20,101.) It is surprising to find a politician like Mr. Mill arguing from the natural unsafety of illicit sexual intercourse, and suggesting the infliction of a penalty on soldiers and sailors who are found to be deceased (*Ques.* 20,035), notwithstanding that they are prevented by other penalties from lawfully satisfying their natural instincts. As I shall show, the reference to the moral question is purely fallacious, and hence the distinction sought to be made between the venereal and other contagious diseases cannot be sustained. If measures for the prevention of small pox are allowable, they are so also for the prevention of syphilis, and their permissibility must be judged of simply by reference to public policy. Mr. Mill's judgment is, moreover, blinded by

his jealousy for the security of personal liberty, which he affirms to be one of the greatest principles of legislation. No doubt this is true, but it is a mistake to suppose that there is any *natural* right to such security. It has grown up with the development of political government, and it has always been subject to the requirements of public policy. Instead of trying the Contagious Diseases Acts by the test of personal security, the applicability of this principle ought to be determined by reference to the facts which gave rise to the Acts themselves.

This is the more evident from the consideration that the persons affected by them are engaged in a calling which, although not unlawful, is one which it would be contrary to the interests of the State to legally recognize further than may be necessary for the purpose of controlling it, and of mitigating as much as possible the evils springing from it. If certain women follow a calling which public policy requires shall be rather discouraged than otherwise, and the exercise of which is pernicious to the State rather than the reverse, a certain amount of the personal liberty which Mr. Mill properly values so highly may justly be withheld from them. The Report of the late Commission very well says that the temporary suspension of personal freedom in case of a diseased prostitute, "such suspension being strictly measured by the time required to effect the patient's cure, and accompanied by no restraint unnecessary for such purpose, is not to be regarded as an infringement of a great constitutional principle." (i. p. 15.)

The detention of the prostitute in hospital is objected to by the Conference of delegates from the Associations formed to promote the repeal of the Contagious Diseases Acts on a somewhat lower ground. Their memorial, which is said to read "more like a vindication of the Rights of Prostitution than a grave argument against the Acts on moral and political grounds" urges not only that prostitutes "value their personal liberty as highly as other women do," but that, to confine such a woman when diseased in a hospital until cured would be "to change the whole structure and arrangement of her life; the relations which she may have formed would be abruptly ended; milliners, dressmakers, sempstresses, domestic servants, &c., who eke out a precarious existence, or provide themselves with coveted luxuries in the form of dress, &c., by recourse to occasional prostitution, would at once lose their business connections, or if in situations would be discharged." The Report of the Royal Commission well says that this furnishes one of the best apologies for the present legislation.

and it adds that the rest of the memorial "consists mostly of frivolous objections to the machinery of the Acts." (p. 12.)

It is not necessary to consider at any great length the objection drawn from the idea that "it is unfair to exempt men from the restraints and regulations to which women are subjected." This objection is so evidently the creation of sentiment that in a question where public policy alone should prevail it cannot require any laborious refutation. Assuming the unfairness to be established, no argument in favour of the repeal of the Acts can be adduced from the fact. The legitimate inference would be that they should be so extended as that men as well as women should be brought within their scope. This, indeed, is insisted on by many of the opponents of the Acts, and the Secretary of the London Female Preventive and Reformatory Institution asserted that he would not object to women being subject to periodical examination, if men pursuing a licentious life were also subject to it. (*Ques.* 18,180.) The Commissioners, however, expose the weakness of such reasoning when they remark that no comparison can be made "between prostitutes and the men who consort with them. With the one sex the offence is committed as a matter of gain; with the other it is an irregular indulgence of a natural impulse." (*Rep.* i. p. 17.) If it were otherwise, however, it would rest with those who require such an extension of the Acts (which is a question wholly different from that of their repeal) to show the necessity of that extension, and the possibility of its being carried out. Now, no attempt has been made to do this. The possibility of it, except in the case of soldiers and sailors—to whom a system of periodical examination has been applied more or less perfectly—has yet to be proved, and the very idea of such a thing may be shown to be absurd by reference to the statement of one of its strongest advocates, who affirms that "there is scarcely a man in London to-day but would, if his deeds were known to his fellows as they are known to God, and this legislation were fairly applied, but would have to go before a magistrate and sign the submission to the Act." (*Ques.* 18,177.) It is hopeless to reason with a man who so defines "prostitute" as to include "every man resorting to any woman other than his wife" (*Ques.* 18,181), and who makes the definition the ground for serious argument. According to his own showing, it would be simply an impossibility to apply the Contagious Diseases Acts to "male prostitutes," and any argument founded on the hardship of placing restraint on women alone thus falls to the ground.

Nor is it more easy to prove the *necessity* of periodical examination of the men who frequent public women, and until this is established the contrary must be received as *primâ facie* correct. The very fact that the health of the soldiers and sailors, as shewn by the evidence of medical officers of the army and navy, is so much improved since the introduction of the Acts—an essential part of the working of which is the periodical examination of prostitutes—is itself an argument against the necessity of such an examination for men. This question appears to have been considered by the late Commission. Their Report says, assuming "that the most effectual mode of preventing the disease is the regular examination of the public women at short intervals, yet in the narrow circle to which these Acts are limited, the process of prevention is continually disturbed by the influx of women from foreign ports, and of soldiers and others from unprotected stations, and women from other localities. A partial remedy for this may have been found in the examination of the seamen and marines before leaving the ship, and of the soldiers on arriving at their quarters. But a more effectual means of prevention would be to make the partial enactment general, or at least to extend it to the large towns; and we should feel it our duty to recommend the adoption of the one or the other of these measures were the physical aspect of the question alone referred to our consideration, but we are required to pursue our enquiry into the moral and political bearing of the Acts, and in these branches of the subject we have found more doubt and difficulty than in those which we have already discussed." (*Rep.* i. p. 11.)

This brings us to the consideration of the moral aspect of the question, and as the Report, although so loud in praise of the physical advantages conferred by the Contagious Diseases Acts, recommends the practical repeal of the Act of 1869 by the discontinuance of the periodical examination of the public women on which its efficiency was shown to depend, it is necessary to see what are the moral objections which led the Commission to adopt such a course. That they were not induced to do so by the notion, which has so much weight in certain quarters, that it is wrong for the State to do anything which can be construed into a recognition of prostitution as a system, is evident from their being in favour of the revival of "the compulsory powers of surgical examination and committal to hospitals which were contained in the Act of 1864." (i. pp. 19, 23.) What were really the reasons which

induced the Committee to recommend a return to the system of 1864, I must confess that, after a careful consideration of their Report, I have failed to discover.

After stating that the principal objection is to the periodical examination which is considered so essential to the efficacy of the Acts, and that it is a grave question "whether the system could be maintained in the face of objections, which, on moral grounds, have been raised against it," the Report continues: "Prostitution may be said to be tolerated by the law, because it is not an offence punished by the law; but toleration is a negative quality, and the bound of toleration is overstepped when the law interferes to place prostitutes under regulations with the avowed object of protecting those who consort with them from the dangerous consequences to which illicit commerce is liable. Thus, it is said, prostitution is indirectly if not directly recognized as a necessity." The Report continues, "on the other hand, it is contended that by placing prostitution under regulations it is not recognized as a necessity, but the fact of its existence only is recognized." The Commission sum up that it is difficult "to escape from the inference that the State, in making provision for alleviating its evils, has assumed that prostitution is a necessity." (p. 14.) To my mind it appears equally difficult to imagine that the Commission have allowed their judgments to be affected by such an argument as this. Fancy the legislature gravely discussing whether robbery or murder is necessary, before attempting to deal with its evils! It may be said, however, that the objection receives its weight from the fact that legislation in the former case is for the purpose of rendering sensual conduct safe. But this is merely an evasion. The argument is that it is wrong for the State to recognise prostitution as a necessity. Hence any mode of recognition would be equally reprehensible. The registration of prostitutes, or the special regulation of their conduct, and even the treating them as criminals, must on that principle be alike condemned, although some of the sterner opponents of the Acts wish to see prostitution penally dealt with. The truth is that the State has not the slightest concern with the necessity or otherwise of prostitution, or of any other immoral system. In all ages there has been a class of women who have devoted themselves to a life of sexualism, and judging by experience, therefore, it might justly be said that the existence of that class is necessary. But the State has only to recognise the *fact*, and the practice of prostitution being

attended with certain consequences which public policy requires shall be got rid of if possible, the State is called upon by the first principles of its own existence to deal with them (just as it would if those consequences arose from the practice of robbery or murder) in the way which under all the conditions of the case is the most fitted to attain the end in view. Even if it were impossible, instead of difficult, to escape from the inference that the State in making provision for the alleviation of its evils, has assumed that prostitution is a necessity, nothing could be deduced from the fact as against the Contagious Diseases Acts. The assumption has relation simply to the past and the present, and it cannot be concerned with the future except so far as the conditions of social life may continue such as to render it certain that prostitution will be a great fact then as now.

To return to the Report of the Royal Commission, it next says, "there is some evidence that the women themselves consider that they are a privileged class; some of them are called 'Queen's women;' some exhibit the printed order to attend the periodical examination as a certificate of health; and there is also some slight evidence that the protected districts are resorted to by strangers for the purpose of safe indulgence." I refer to these points to show what considerations were present to the minds of the Commission when their Report was made, but surely they cannot have had any influence in determining the conclusion arrived at. Supposing that some of the women subject to the operation of the Contagious Diseases Acts believe themselves to be a privileged class, and occasionally call themselves "Queen's women," or pass off the order to attend for examination as a certificate of health, how can such facts render the Acts immoral or improper? Is a great question of social economy to be determined by the ignorant fancies of the lowest class of prostitutes, or by their attempt to impose on the credulity of those who consort with them? If it is contrary to public policy that certificates of health, or what can be used as such, should be given to public women, let these documents be dispensed with. Strange to say, the Chairman of the National Association for the Repeal of the Contagious Diseases Acts, who objects "to invest public money in facilitating prostitution by making fornication more healthy," takes a somewhat different view. He thinks it a hardship that the woman who is discharged from imprisonment and certified to be free from contagious disease, is not allowed to retain possession of the certificate (*Ques.* 19,583 seq.)

This is, clearly, for her own protection, but being so the peculiar nature of the opposition to the Contagious Diseases Acts made by the Association which he represents is the more evident. From the evidence it might be supposed that this opposition is undertaken in the interests of the prostitute class, and that its great aim is to protect their rights against infringement. It is not so in reality, however. The great ground of objection to the Acts is that they render more safe an act which so seriously offends against the canon of Christian morality as illicit sexual intercourse. But there is an incongruity in such opposition which ought to go far towards rendering it worthless. If it were founded on the broad principle that no encouragement ought to be given to the practice of sexual immorality it could be understood, but when the objection is supported by reference to the rights and interests of those who are the chief agents in that immorality the effect is neutralized. The tenderness for the sinner while condemning the sin shown by so many of the opponents of the Contagious Diseases Acts is a most curious phenomenon. It might be thought that their penal character would have recommended them to a certain extent at least; but instead of this, the fact that the Acts render temporary concubinage comparatively safe is considered a sufficient reason why prostitutes should be incited to resist their being carried into effect, to their own detriment and to that of the State.

The final moral objection which struck, although it cannot be said to have influenced, the Commissioners, is by far the most important. The Report says, "a great deal of contradictory evidence has been taken as to the effect of periodical examination on the women themselves. On the one hand it is insisted that it has a tendency to extinguish any sense of shame that may still linger in the breast of the oldest prostitute, and that it hardens those who are not yet confirmed in their infamous occupation. On the other, it is argued that the examination has no such effect; that virtuous women are constantly subjected to a similar examination, and that a woman who submits to promiscuous intercourse can retain no sense of shame, nor can be hardened by being dealt with under a regulation of sanitary police. In this conflict of testimony upon a question of moral tendency, and resting on no sound basis of proof, we cannot determine to which side the balance of opinion inclines; but we may remark that the case of a modest woman submitting her person to a medical examination by a private practitioner, and that of a prostitute coming up

every fortnight to be examined by a medical officer, are very different. Assuming that in either case the operation is conducted with an equal regard to decency, the object with which it is performed makes all the difference. In the one case the examination is voluntary, occasional, and may never be repeated. In the other, the examination is compulsory, and regular, and instituted not because the woman is diseased or even suspected of being diseased, but because she may be diseased. But whatever may be the moral effect of the periodical examination on the public women, we are assured that a large proportion, if not the majority of them, appreciate the benefit of a vigilant watch over their health, and that the regular attendance at the examination room has wrought an improvement in their demeanour, dress, and general condition." (p. 14.)

It is remarkable how evenly the evidence on either side of the moral aspect of the question affected the minds of the Commissioners. They cannot determine on which side the balance of opinion as to the effect of periodical examination on the women subject to it inclines. They seem, finally, to be on the point of deciding that it has an immoral tendency, when they add that it has been attended by an improvement in the conduct of the women, while a large proportion of them appreciate the benefit conferred upon them by periodical examination. In the face of this, it would be absurd to suppose that any moral consideration derived from that practice had any weight with the Commissioners in leading them to propose that it should be abolished. They had already declared that physically considered the Contagious Diseases Acts had been successful, the success being due chiefly to periodical examination; while their reference to the misapprehension of the real moral bearings of the question shows that they attached little importance to the objection of those who see in those Acts a recognition of prostitution by the State. In fact "dealing directly with the disease" as much constitutes such a recognition as dealing with the prostitute class. As though in sheer hopelessness of finding any definite reason for their decision, the Commissioners proceed to say "we have come to the conclusion, however, that although the periodical examination of common prostitutes is the most effectual mode of dealing with venereal disease, it would be difficult if not practically impossible to make the system general, even if on other grounds it would be desirable to do so. Thus, while the disease is general throughout the

country, the remedy for it would be confined to a few favoured places; a state of things which we likewise believe could not be permanently maintained." (i. p. 14.) It is thus affirmed, although why does not appear, to be impossible to make the system of periodical examination general, while on the other hand it could not—although the reason is not mentioned—be permanently maintained in a few favoured places, and therefore it should not be allowed in any.

At first sight it would be supposed that the question of the *universal application* throughout the country of the principle of examination and the idea of favouritism were influential in leading the Commission to that conclusion. This would evidently be a mistake, however, since, not only does the Report recommend that the Act of 1864 should be extended to any place in the United Kingdom (except the cities of London and Westminster), from which a request for such extension should be made, and in which proper hospital accommodation should be provided (p. 19), but it expressly states that there are reasons sufficient to justify exceptional legislation, although a subtle distinction is made between applying special regulations exclusively to military and naval stations, and applying them for "the treatment and control of a class of persons frequenting certain districts under conditions calculated to engender and propagate disease." (p. 13.) Finally, the difficulty in making the system general, or in maintaining it in favoured districts, might be thought to depend on the difference between periodical examination and the dealing directly with the disease, if it were not that the Commission were prepared to recommend the general extension of the former system if the physical aspect only of the question were under consideration.

The analysis of the Report of the Commission thus reveals the fact that not a single reason of any weight is discoverable why the compulsory system established by the Contagious Diseases Acts should be abolished, and I can only suppose that some influence other than that of reason led to such a result. What the influence was may be gathered from the observation that it might be possible to make some modification of the Acts "by which they might be stripped of their anomalous and offensive character without materially impairing their efficiency." That is, periodical examination of public women is to be discontinued because it is offensive, not to the women themselves, or to the medical men engaged in carrying it out, but to the opponents of the Acts. The

meaning of which is that the clamour made by certain people was so loud that the Commissioners dare not wholly disregard it, and they thought to "throw a sop to Cerberus" in recommending the abolition of periodical examination of prostitutes, while retaining the voluntary examination and the compulsory powers of the Act of 1864, which "dealt directly with the disease." The anomalous character which the Acts are supposed to possess is to be got rid of by authorizing the extension of the provisions of the earlier Act to any place in the United Kingdom (except London and Westminster) which may desire to adopt it. At the same time it was possibly thought that such a provision as this would lead the supporters of the Acts to offer less opposition than they would otherwise have done to the loss of the periodical examination, which they considered to be essential to their operation!

The majority of the Commissioners may have really brought themselves, in their desire to occupy a medium position, to believe that the Act of 1864 would, if allowed fairplay, "work with vigour and efficiency" (i. p. 14); notwithstanding the opinion of Sir John S. Pakington and those who joined in his protest that "every attempt to show that the physical results of the Act of 1864 were satisfactory and sufficient, or that they can be compared to those of the Acts of 1866-69, during their short period of action, have failed." (i. p. 21.)

Whether there are really any fair grounds for supposing that the voluntary system of 1864, could now be worked with more satisfactory results than was formerly the case, will be considered shortly. Several other moral objections, however, are referred to by the Commissioners, and these, although not particularly examined by them, it is advisable first to notice. Thus, it is said that such legislation as that of the Contagious Diseases Acts has a tendency to promote immorality, on the one side by rendering vicious indulgence less hazardous, and on the other side by making prostitution more remunerative. The former part of this objection means simply that what is called "vicious indulgence" ought to be hazardous, and it could be used only by those religionists who suppose that the results of what they call "sin" are divinely ordered punishments which ought not to be interfered with. The same may be said as to the latter part of the objection, which can only mean that the women who follow a life of prostitution ought to be kept in a debased social condition, and, in fact, to be treated as outcasts. The whole objection,

however, is open to the remark that it is almost, if not entirely, unsupported by evidence. There is, indeed, evidence in support of the opposite view, and the very fact that the public women in the protected districts have so largely decreased in number since the application of the Acts is proof that girls have not been tempted to lead a life of prostitution by its increased gains. Even if it were true, however, that the Acts had a slight tendency to promote immorality in the way supposed, this would be a lesser evil than that which they are designed to combat.

The objection that the Acts are designed to provide sound prostitutes for soldiers and sailors is a mere restatement of the objection that it is sought by the operation of the Acts to lessen the danger attendant on "vicious indulgence." The fact that this has been effected cannot be denied, but instead of constituting a ground of opposition to the Acts, if taken alone it is a great argument in their favour. It shows that this legislation has answered its object, and it must be opposed therefore on some broader principle. In fact nearly all the moral objections to the Contagious Diseases Acts are founded on such a principle which, as we have seen, has affected the judgment even of Mr. Mill, and which may, therefore, well have warped that of persons noted rather for their religious prejudices than for their reasoning powers.

That the principle here referred to—the sinfulness of illicit sexual intercourse—has given great weight to the clamour against the Contagious Diseases Acts is shown by the contents of the Contagious Diseases Prevention Bill introduced into Parliament by Mr. Bruce, the Home Secretary. This Bill asks absolutely to repeal every portion of those Acts, and in lieu of them to substitute certain provisions applicable only to prostitutes imprisoned in pursuance of a conviction for any offence *as such*, or of a conviction by a Court of summary jurisdiction for any other offence. If the extraordinary impressionableness of the present Home Office were not so well known, the proposal to substitute for the Contagious Diseases Acts such a measure as this in the face of the Report of the Royal Commission would be simply astounding. This Report did at least recommend a return to the system established by the Act of 1864, and that it should be extended to any place in the United Kingdom asking for the extension and providing the necessary accommodation, but the Bill not only completely ignores the provisions of that Act, but its own provisions are such that it may safely be said that, if enacted

without great alteration, it would be almost inoperative. The gist of the first part of the Bill, that with which we are at present concerned, is to be found in section 3. This section provides that a common prostitute, found at the expiration of the term of her imprisonment to be affected by contagious disease (meaning venereal disease), shall be liable to be detained in the infirmary of the prison or to be removed to a certified hospital. This liability is, of course, only to arise at *the expiration* of the term of imprisonment, but the Bill goes on to provide that "where a woman, so liable, is found *within seven days before* the expiration of the term of her imprisonment to be affected with contagious disease, the fact of her being so affected shall be reported by the gaoler of the prison to a justice of the peace." This is strange enough, but how is the gaoler to know whether a woman is diseased or not? There is no provision giving power for this object, and no prostitute, therefore can, be examined for the purpose of ascertaining whether or not she is diseased. The third section of the Bill in fact expressly provides that "nothing in this section shall authorize an examination of a common prostitute in any ordinary prison further or other than may be made in the case of any other prisoner." The intention, therefore, is that any prostitute found, on undergoing the examination common to all prisoners, to have venereal disease shall be dealt with under the Bill. The Prison Act, 1865 (28 & 29 Vict. c. 126) provides "all prisoners, previously to being removed to any other prison, or being discharged from prison, shall be examined by the surgeon" (Schedule 1, Rule 10), but the use of the speculum which is often absolutely necessary for the detection of the disease is not authorized by the Act, and no woman could be compelled to submit to such an examination under it. It is evident, therefore, that Mr. Bruce's Bill, if passed, would be of very limited use in dealing with the special evil against which it is directed. But supposing the gaoler is satisfied, on the report of the examining surgeon, or by some occult process of his own, that a prostitute prisoner is diseased, and informs a justice of the peace of the fact, the inadequacy of the Bill becomes still more apparent. The 3rd section proceeds "and such justice, unless he is satisfied that she is not so affected, or that she intends to go to some asylum or other like institution, or otherwise to cease to be a common prostitute, shall order her to be detained in the infirmary of the prison for such period as is provided by this Act, and the woman shall be detained in such prison infirmary accordingly."

Now, how is the justice to satisfy himself on the points mentioned? No power is given to him to send the woman again to the surgeon for further and special examination. He can certainly take evidence, and there is nothing to prevent the woman giving evidence in her own favour on the point in question. Unfortunately, however, the prostitutes who would come within the provisions of the Act belong to a class whose word in such a case could hardly be believed on oath. This difficulty applies to the other parts of the provision under consideration. Let it be known to such women that they will not be detained if they intend to go to an asylum (what kind?) or a like institution, or otherwise to give up their calling, and the prison infirmary will be visited by few of them. For it is only the *intention* that the justice has to be satisfied about, and a fit of penitence is as easily simulated as a fit of epilepsy. Moreover the woman only has to show her intention to cease to be a "common prostitute," and in many cases she would be able to do this so as to satisfy the requirements of the Act, without any undertaking really to give up prostitution.

Probably a few, although not many, women would be detained in the prison infirmary or in a certified hospital, as provided by the latter part of the third section of the Bill. This being the case, Mr. Mill and those who rest great part of their opposition to the Contagious Diseases Acts on their interference with the liberty of the subject will, if they are consistent, equally oppose the Contagious Diseases Prevention Bill. For this is to affect diseased prostitutes only from the termination of their imprisonment, and under its provisions, however short may have been the term of such imprisonment, they may be further detained for a period of nine months. Not only so, however, but if a woman so detained leaves a certified hospital before she is duly discharged, or refuses to confirm to its regulations, she may be arrested without warrant, and on conviction, may be imprisoned, with or without hard labour, for a term not exceeding a month, after the expiration of which she is to be further detained in the certified hospital. The hardship, from the constitutional point of view, of these provisions is increased by the fact that they are applicable to the case of common prostitutes who are imprisoned for slight offences. Practically, the further detention is an addition, and in most cases a very serious one, to the punishment for the original offence, and there is no principle whatever on which such a state of things can be justified. Much may be urged in favour of confining in hospital every prostitute found to be

diseased, but that such a course should be adopted only in the case of prostitutes who are imprisoned for statutory offences is, if anything can be so called, utterly unconstitutional. It is possible, however, that the proposed Act might have a wider operation than its promoters suppose. Under the Vagrant Act of 1824, a common prostitute behaving indecently in the public streets, is liable to be imprisoned, and the 2nd section of the Contagious Diseases Prevention Bill enacts that "every common prostitute who in any public street, public highway, or place of public resort, solicits or importunes persons for the purpose of prostitution, shall be deemed to behave in an indecent manner within the meaning of the Vagrant Act, 1824." It is evident what a dangerous power is placed by this provision in the hands of the police. The probability is that it would be held by many police magistrates that a prostitute publicly addressing a man does so in the way of her calling;* and therefore it would only be necessary for a policeman to swear that such a woman spoke to a man in the public streets to ensure her conviction under the Vagrant Act. It would often be difficult, in the absence of a definition of the term "common prostitute," for a woman to disprove that she is such, and it would be still more difficult for a prostitute to establish, against the evidence of the policeman and the presumption arising from her calling, that she had not solicited or importuned for the purpose of prostitution the man with whom she was conversing. This would, in fact, be almost impossible, as the man would in most cases be a perfect stranger to her, and would probably never know that she had been arrested. The provision in question is so dangerous in its bearing on the liberty of the subject and as an instrument of extortion by the police that it is by far the most objectionable feature of the Bill. The opponents of the Contagious Diseases Acts dwell strongly on the power placed by them in the hands of the police to interfere with women who are not prostitutes, but the absoluteness and generality of the new provision makes it much more objectionable on that ground than anything contained in those Acts. This is quite apart from the question whether such a provision can be introduced without completely altering the whole legislation on the subject of

*Mr. Bruce in his speech made on moving for leave to introduce his Bill, as reported in the *Daily News*, gave as the reason for the proposed alteration of the Vagrant Act, that "many magistrates held that, unless the annoyance was proved by the person solicited, they were not justified in convicting, and owing to the reluctance of people to give evidence in such cases the law had become a dead letter."

prostitution. This is not by our law a crime and, therefore, no act not in itself criminal ought to be treated as such, simply because it has relation to prostitution. The second section of the Contagious Diseases Prevention Bill does in fact introduce a totally new principle, and one which ought to be viewed with the utmost distrust, and not agreed to without the most careful consideration. It is the thin end of the wedge which must end in measures for the absolute repression of prostitution, an attempt at which would be attended by the most frightful consequences.

I shall leave the Contagious Diseases Prevention Bill after having referred to the influences under which it has been produced. Hardly a single speaker on the motion for leave to bring in the Bill spoke in favor of it. Of course it does not go far enough for the religious party represented by Mr. Jacob Bright, but on the other hand all those speakers whose opinions on this question are worthy of consideration strongly condemned the measure as a weak concession to unreasoning prejudice. Sir John Pakington considered the course taken by the Government as timid and unworthy, and he regarded the Bill introduced by Mr. Bruce as the triumph of prejudice and clamour over reason and truth. Sir J. Salusbury Trelawny characterised the conduct of the Government as timid, irresolute, and unfortunate, and referring to the charge made by Mr. Jacob Bright against the Act of 1864, that it was the most infamous Act that ever passed the House, he remarked, amid loud cheers, that it was the most benevolent Act which had been passed this century. Dr. Brewer declared that more good had been done by the Contagious Diseases Acts in the three years they had been in operation than the united efforts of the whole religious world had effected. This remark was practically confirmed by Sir J. Elphinstone, who stated his belief that 38 per cent. of the prostitutes affected by the Acts were rescued from their life of shame. He viewed the repeal of those Acts as showing the greatest cowardice on the part of the Government. Judging from the report of Mr. Bruce's speech on the introduction of the Bill the charge is fully justified. He stated that, although there was a difference of opinion on the moral effects of the Contagious Diseases Acts, "the general conclusion to which he had arrived was that its effects in preventing women from entering on a profligate life was so strong and so great as to make the moral good prevail over the moral evil." He admitted, moreover, that "the evidence given by both naval and military officers was con-

clusive to the effect that wherever the Act was put in operation there was a great diminution in the amount of prostitution. The most blessed effect of the Act was that it had almost entirely put a stop to that most horrible form of vice—juvenile prostitution . . . . . Another very great advantage was the improved maintenance of public order throughout the districts. The scenes which were described as having formerly occurred in some of our seaport towns were disgraceful to a civilised community." (*Daily News*, 14th Feb., 1872.) No testimony could be stronger than this in favour of the continuance of the Contagious Diseases Acts, and Mr. Jacob Bright recommended the speaker to the sympathy of the House, because it was his cruel fate to repeal Acts of Parliament which he considered highly beneficial and highly successful. What then was the reason of this surprising inconsistency? Mr. Bruce first said that the Government had arrived at the same conclusions as the Commission, on whose Report the Bill was consequent that "it was impossible to maintain in certain limited districts and amongst a large civil population a system which was not capable of being extended to other parts of the country. They were of opinion that the system of periodical and compulsory examinations could not be made the basis of general legislation." Now, I have already shown that, although the Commissioners expressed such an opinion, they were inconsistent with themselves, as in another part of their Report they expressly said that judging from physical considerations alone they would recommend the extension of the compulsory system to the whole country. No ground whatever is given for the opinion, and it must be characterised as expressed (not formed) simply as an excuse for timid and unreasoning action. Sir J. Pakington, who was one of the leading Members of the Commission, remarked in the House that his hearers "knew the influence which was sometimes brought upon Members of the House, and no one could have sat on the Commission without seeing very clearly the influence brought to bear on their proceedings." In the expression by the Report of the opinion that it would be practically impossible to make the system of periodical examination general, we seem to have the result of such an influence. But surely Government would not dare to ground such an important measure as the abolition of the Contagious Diseases Acts simply on so lame an excuse, which seems as though it had been framed expressly as a support to their Bill. No, another reason had to be given, and Mr. Bruce, while apologising for seeking to repeal Acts which were admittedly doing much good, sought to justify himself on the ground that "it is impossible to maintain laws which have not the sanction of public opinion." He added, "there is no wiser maxim than that of Burke, that legislation should not force, but should follow public opinion. At present public opinion has been rather forced than followed in this legislation. I cannot conceive anything more mischievous than the continued agitation upon this subject, and without passing reflections upon anyone, I submit that any good which these Acts might have produced can hardly be held to counterbalance the demoralization and mischief caused by the agitation that has taken place." The demoralization here referred to by Mr. Bruce is evidently that of the female opponents of the Acts, and it is Mr. Bruce's mistake that the agitators who have caused the mischief which he so highly deprecates, represent public opinion. The Members of the House of Commons are usually thought to represent the country at large, and it is a monstrous thing that the conclusions arrived at by Parliament, after the various searching enquiries that have been made before Committees of both the Lords and the Commons, and expressed in no less than four separate Acts, should be overturned by the outside influence of religious purists and over zealous managers of Homes for Fallen Women. If the expression of public opinion is to be gathered outside of Parliament, let it be sought in places where the Contagious Diseases Acts have been in operation for a reasonable length of time. Take for instance the Borough of Chatham, represented by Mr. Otway, who stated on the introduction of Mr. Bruce's Bill that he doubted the sanitary efficiency of the Acts and spoke in favour of their repeal. The consequence of this speech was the presentation of a petition signed by Major General Brownrigg, C.B., and all the military officers and their wives, together with many civilians and most of the clergymen of the district, urging Mr. Bruce not to repeal the Acts, and showing conclusive grounds in support of their request. The inhabitants of Chatham are not alone in this respect. Appendix D to the Report of the Royal Commission contains petitions and memorials in favour of the continuance of the Acts from the Mayor and Council of Winchester, the Board of Guardians of Farnham Union, the Magistrates and Parochial Authorities of Dover, the Local Board of Health for the District of Aldershott, the Magistrates and many leading persons in the district comprising Plymouth, Devonport, Stonehouse, and Dartmouth, and from the Mayor and Corpora-

tion of Southampton. The last named is in one sense the most important, as the Acts have been only a short time in operation in the Southampton District, and a powerful agitation was there got up by their opponents. It is only fair to say that a petition against extension of the Acts to the civil population of Southampton was presented by twenty-seven clergymen and ministers of that town. This opposition is, however, sufficiently accounted for by the fact that the Acts had not come into operation before the petition was presented, and the experience of other towns justifies the belief that the opinions of the clergy there on the subject will change when the benefits to be derived from them are witnessed.

I have now considered nearly every question connected with the Contagious Diseases Acts, but before bringing this pamphlet to a close it is desirable that further reference should be made to one or two points as yet only incidentally mentioned. It is remarkable that a large proportion of the persons who gave evidence before the late Royal Commission in opposition to the Act, are connected, directly or indirectly, with what may be called the religious movement for the rescue of fallen women. The determination evinced by some of these persons to think nothing but evil of the Acts, and to deny that women have been rescued from a life of prostitution through their agency has much the air of professional jealousy. Mrs. Lewis says that Portsmouth Hospital and Penitentiary only boast of two reformed in the year, and that she does not believe that every facility is given girls in Hospital to leave their mode of life. (*Ques.* 12,676, 7). Mrs. Butler considers reformation of prostitutes effected under the Contagious Diseases Acts accidental, and she doubts whether such a reformation would be a benefit if it could take place by virtue of their operation. (*Ques.* 13,093 seq.) The assertion of these and other witnesses is so strong that they must believe the truth of what they say, and yet the statistics furnished in the appendix to the Report of the Commission so completely demonstrate the erroneousness of their opinion, that I can only suppose them to have become hopelessly prejudiced. There is no difficulty in recognising the source of this prejudice when we remember the high moral views enunciated by Mrs. Butler, who believes that there is not a supporter of the Contagious Diseases Acts "who dares in the privacy of his own chamber to intreat our God, who is of purer eyes than to behold this iniquity, for the continuance and extension of them" (*Ques.* 12,932); and when we find Mrs. Lewis saying that it is wrong to make a law to regulate

prostitution, because the Bible says that we are not to make provision for the flesh to fulfil the lusts thereof but to flee from fornication, and that she cannot understand legislating for the sin of prostitution. (*Ques.* 12,603). These ideas are at the foundation of ninty-nine-hundredths of the opposition to the Contagious Diseases Acts, and yet they are wholly beside the question. The State has nothing to do with "sin," a term which simply expresses a theological dogma. It is concerned only with crimes, or with actions which owing to the evils which accompany them it sees fit to stigmatise as such for certain purposes. The State may, therefore, legislate in relation to prostitution just as it does for theft, although the aim of such legislation must necessarily be different in either case. In prostitution the sexual act affects directly only the persons concerned in it, while in theft the very gist of the action is its injurious effect upon some one else. In the former case, therefore, legislation is regulative, but in the latter it is necessarily preventive. It would no doubt be very improper, because injurious to the interests of society, for the State to aid directly in the commission of what is called "sin." But this has not been the effect of the Contagious Diseases Acts, although its religious opponents assert the contrary. The making of certain provisions for the good of the State, the indirect consequence of which may possibly be the inducement to some extent to conduct considered sinful, is totally different from the furnishing of direct sanction and aid to such conduct. A few men, who would otherwise be deterred from it, may be led to practice illicit sexuality by the knowledge that they run no risk of contracting disease, and a few girls may be induced to prostitute themselves by the supposed fact that the gains of prostitutes are increased by the operation of the Acts. But against these evil consequences, if they really exist, let us place the important facts that, not only the man who associates with a public woman escapes from the deadly venereal scourge, but innocent women and children are protected from it, and that a large number of girls are hindered from becoming prostitutes or are rescued from such a life. Viewed in this light, it is seen that the indirect evils are so small as compared with the direct benefits that the Acts are not only justified but are absolutely required by every consideration of State policy.

This is on the assumption that the illicit sexual intercourse of prostitution has that extraordinarily sinful character which is ascribed to it by the opponents of the Acts. I shall elsewhere show that the ideas usually entertained on this sub-

ject are very erroneous, and that prostitution derives most of its evil consequences from the action of society. Religious people, having so strong an idea as to the sinful character of illicit sexual intercourse, it is not surprising that they should bitterly oppose any action of the State having for its result the safety of that intercourse. It is surprising, however, that those who thus act should be guilty of the very conduct they thus condemn. They object to the Contagious Diseases Acts because they make the practice of immorality safe by compelling prostitutes to be cured of venereal diseases, and yet many of them would treat such women for the same diseases, and even enforce regulations for detaining them in hospital until cured. (*Ques.* 13,086 seq.) It is true that in the latter case the treatment and detention are voluntary, while in the former they are compulsory, but the actions are the same and, what is more important, the consequences are the same. The very object of the treatment of the woman is to restore her to the condition of health in which she is able to continue her life of prostitution. There is not the slightest difference in this respect between the compulsory action of the Contagious Diseases Acts and the voluntary action of their opponents. Sir J. Pakington put it to Mrs. Butler whether she was not falling into the evil she condemned in sending a woman, who had been cured of disease in a voluntary hospital, "out in a more tempting state to men than when she came in," and increasing the "value of the commodity." Mrs. Butler very consistently replied, "if we are doing so then it is incumbent on us to stop and utterly prevent that. We shall not do that in any case." (*Ques.* 13,092.) But the fact is, the supporters of voluntary hospitals must either do it, and that very often, or else confine those institutions to women who have ceased to be prostitutes, in which case the so-called Hospitals would be merely Homes where medical treatment is provided. Mrs. Butler says, indeed, that every possible effort would be made that a woman should not return to a life of vice, and that she should not be in any sense a commodity. This is no doubt true, and its guarantee is found in Mrs. Butler's own conduct,* but it is

* I willingly cite the following passage from a letter addressed by Mrs. Butler to the editor of the *Rue Hire* (May 18th, 1872):—"I have Sir, but one little spare bed-room in my house, not being a grand lady! Into that little room I have received, with husband's joyful consent, one after another of these my fellow sisters; we have given *to them* in the hour of trouble, sickness and death, the best that our house could afford, and requested friends of a higher rank who visited us to go to a neighbouring hotel. In that little room I have nursed poor outcasts filled with disease, I have loved them as if they were my own sisters. Many have died in my arms. We

evident that the hospitals intended by her are not the institutions which simple charity would suggest, and that these would be utterly repugnant to the feelings of those who look upon venereal disease as an ordained punishment, like the leprosy of old, for sin.

Although the State has no actual concern with the morality of the conduct which gives rise to those evils which the Contagious Diseases Acts are intended to remedy, yet it is the duty of the State to consider the moral effects of its legislation. Most of the objections to those Acts have been founded on the moral evils supposed to result from their operation, and those objections have already been examined, and we find that whatever weight they may have in themselves is lost as compared with the benefits on the other side. There is one objection, however, which is deserving of further consideration. The Report of the Royal Commission says that a great deal of contradictory evidence has been taken as to the effect of periodical examination on the women subject to it. Now, if it could be established that this examination is so utterly degrading as various persons profess to believe, I should feel strongly inclined to advocate unreservedly its total abolition. However beneficial may be certain of its results, it is possible that the evils attending it may be so great as to render the periodical examination of the women subject to the Contagious Diseases Acts perfectly unjustifiable, and such would be the case if that practice had so demoralizing an effect as to render the rescue of women from a life of prostitution much more difficult. This cannot be said, however, to result from the mere arousing of a feeling of degradation. It is a great mistake to suppose, as too many people do, that public prostitutes are devoid of all self-respect and modesty. Society, indeed does its best to rob the fallen woman of whatever self-respect she retains by proclaiming her an outcast, but fortunately it cannot always enforce its decree. It is proved by the evidence of all classes of witnesses that the common prostitute is by no means necessarily a stranger to the feelings

afterwards hired a little house, and called it the 'House of Rest,' into which we received others who came. Not far from us there is a cemetery, in a sunny corner of which there stands a row of humble graves, beneath which lie the earthly remains of these our 'children,' 'fallen women,' 'prostitutes,' if you like to call them so, but now resting in the bosom of that SAVIOUR who came to 'seek and to save that which was lost.' For every one of these departed in good hope, and joyfully have found, besides the deeper peace, the treasure of a *pure friendship* before they died." The *bonâ-fides* of Mrs. Butler's opposition to the Contagious Diseases Acts cannot be questioned, but it is none the less irrational.

of modesty. Such being the case, it is extremely probable that some women have a feeling of repugnance when required to submit to examination under the Act, and occasionally indeed it may be accompanied by a sense of degradation. It can hardly be, however, that the particular class of women who are more especially the subjects of that examination entertain any serious moral objection to it. It is difficult to believe that such women can feel any great repugnance to a private examination by a medical man which recurs only once a fortnight. Women of a higher class may occasionally dread it, but the balance of evidence is decidedly against this being the case in general with prostitutes of any grade. The objection where it exists is probably not so much to the examination itself as to the preventible circumstances attending it, but above all to its compulsory and regular character. It is absurd, however, to suppose that any mere feeling of dislike on the part of the public women ought to be allowed to decide so important a question as that affected by the Contagious Diseases Acts. It would be otherwise if it could be established that periodical examination has the effect of demoralizing those subject to it and of confirming them in their career of vice. Mrs. Cooke, the Matron of the Refuge at Chatham, is strongly of this opinion. She says "The girls who come in now under these Acts seem to be thoroughly immodest and given up to vice; and I find they are not so open to good influences as the others, and they seem to have a bad influence on the others that have not been under the Acts, talking to them very rudely, and immodest in their behaviour in their bed-rooms without the greatest supervision; they require so much watchfulness, the operations of the Acts seem to have had a bad effect previous to their coming in." (*Ques.* 19,510.) This is the strongest evidence as to the demoralizing influence of the Acts given before the late Commission, and it is supported by various statements which tend to show that repetition of examination has a hardening effect. Thus, J. A. Phillips, a police constable who had been employed in the execution of the Acts, said that on the first occasion of the women coming up for examination there was with many a certain amount of shame and sensitiveness and afterwards a marked spirit of boldness and of a hardening influence. (*Ques.* 19,743.) Now, I am not by any means prepared to say that in some cases there may not be this moral deterioration, but the evidence of it is in reality very slight. The opponents of the Acts usually feel strongly

on the subject, and they are apt to ascribe effects either to a wrong cause, or to an insufficient one. For instance, the marked spirit of boldness observed in some women was much more likely to have been the result of association with depraved persons in the continued pursuit of their calling than of a simple fortnightly medical examination. Again, the evidence of Mrs. Cook would have considerable weight as to the demoralizing influence of the Acts, if it were not known that the women she referred to were of a very low class, ignorant, dirty, and lazy. (*Ques.* 19,518.) The same was the case with the women of Colchester, referred to by Mrs. Brown. It is really absurd to suppose that these women, who were of the lowest class of prostitutes, could be hardened by periodical examination. In fact, the evidence of this result was merely a levity of manner in going and returning from the hospital rooms, which showed at least, as the Bishop of Carlisle suggested, that the women did not consider the examination a great grievance. (*Ques.* 17,973, *seq.* 17,988.) Moreover, there is directly opposing evidence as to the moral effect of the periodical examination, and such as appears to be conclusive on the point. I will not refer particularly to the testimony of Mr. Parsons (*Ques.* 10,470), Mr. Bulteel (*Ques.* 5,978), and Mr. Donald (*Ques.* 10,307, *seq.*), as their official position may be thought to influence their judgement. That of the Rev. J. G. Gregson, and the Rev. Mr. Fraser cannot, however, be thus objected to. The former, who as Secretary to the Town Mission at Portsea, came much in contact with fallen women there, in answer to the question whether the fortnightly examination has a tendency to confirm the women in their indifference to moral feeling, stated that, instead of demoralizing and hardening them, the operation of the Contagious Diseases Acts had, as many girls themselves assured him, disgusted them with their past lives and led them to give up prostitution. Mr. Gregson stated, also, that the dislike of surveillance and the fear of registration had hindred many women from entering upon or continuing a life of prostitution, and he added that he had "never heard of a single case of a woman who had been reclaimed . . . . . in which she felt that her modesty had been insulted by the examination to which she had been subjected." (*Ques.* 9,628—9,633.) The Rev. Mr. Fraser, the Chaplain of Maidstone Gaol, said that he had made it his business to look after the girls who led immoral lives, whether they had been in prison or not, and that he had not found one who objected to the Acts. He had heard of cases of objection, but

on enquiry he had found that the words had been put into these women's mouths by the opponents of the Acts. His experience was that the periodical examination had not a hardening effect on the women, and that in the case of young girls "it so far teaches them modesty that it is one more reason why they would grasp at any opening to lead them away from the bad life they had just entered upon." Moreover, the periodical examination produces habits of cleanliness and order, and a feeling of respectability comes over many of these women which they have lost for years past. (*Ques.* 15,688 *seq.*)

There is abundant evidence to confirm the opinions expressed by Mr. Gregson and Mr. Fraser, shewing that prostitutes as a rule do not object to examination under the Acts on the ground of indignity or from any feeling of repugnance, and that it has not the effect of destroying their self-respect or of preventing them from abandoning their calling. The evidence shews, moreover, that it is attended with much positive good beyond the special object which it was originally intended to secure. Mr. Sloggett, the present Inspector of Certified Hospitals under the Contagious Diseases Acts, stated that the improvement in the personal condition of the women during the time that he acted as Visiting Surgeon of the Devonport Lock Hospital was something extraordinary. At first "the women would come up covered with filth, dirty in their persons, and altogether presenting an appearance which was almost shocking to humanity; but partly owing to shame at being found in that state, partly owing to discipline in the hospital, and there having learned the comforts of personal cleanliness, the improvement which took place was something remarkable. (*Ques.* 4,097,4,288 seq.) This change for the better in the condition of the public women has indeed been made one of the grounds of complaint against the Acts, since it is supposed to be attended with increased gains which offer temptation to girls to enter upon a life of prostitution. (*Rep.* i. p. 13.) But this objection, and the more general one that the character of the women affected by the Acts is deteriorated by them, is answered by the fact that the number of prostitutes has considerably decreased in the protected districts. The statistics show clearly that this result has been attained, and that the decrease is by no means wholly due to the women having gone elsewhere. A great number of them have, as already pointed out, been reclaimed through the operation of the Acts, and many more have undoubtedly been deterred from rendering themselves liable to them. The Report of

the Royal Commissioners states that "the Superintendent of the Local Police at Plymouth, though of opinion that the statements of his Metropolitan brethren with reference to the Acts were exaggerated, nevertheless admitted that the Acts had reduced the number of public women and that they had a deterrent effect." (i. p. 12.) The evidence of Mr. Sloggett is very important on this point. He says "the results of the Acts have been rather as preventive measures of prostitution, and when we consider that a class of women formerly existed who were called Clandestine Prostitutes, who in the places under the Act have now to a great extent disappeared, and that those women were constantly tending to recruit the ranks of the well-known prostitutes, it will be seen that the Act itself is a great benefit." (*Ques.* 4,549.) There is undoubtedly much contradictory evidence as to the effect of the Acts in relation to clandestine prostitution, but as the opinion of Mr. Sloggett, who is specially competent to speak on the subject (*Ques.* 4,084,4,656), is confirmed by that of witnesses such as Inspector Anniss, Dr. Row, Mr. Parsons, and Capt. Jones, R.N., (see *Ques.* 4,934), I think we may safely accept his testimony. That the Contagious Diseases Acts have the effect of checking clandestine prostitution is what might be anticipated. The fear of exposure, and of being placed on the register, must have a deterring influence on many girls whom moral considerations alone would not restrain from sexual indulgence. It will probably be objected that as in Paris, where the dealing with prostitution is more complete and systematic than in England, clandestine prostitution has greatly increased, we may reasonably suppose such to be the case in England where a less perfect control is established. Supposing the statement here made in relation to prostitution in Paris to be true, although it is denied by Dr. Row (*Ques.* 2,049 seq. 2,118), it by no means, however, supports the inference intended to be drawn from it. On the one hand, it is much more difficult to detect prostitution in a large town than a small one, and, therefore, we should expect the uncertain element classed as clandestine to be relatively much greater in the former than in the latter. On the other hand, the conditions are so different in Paris from those which are supplied by the Contagious Diseases Acts that it is impossible to arrive at any satisfactory conclusion from a comparison of their results. The Continental system of dealing with prostitution is totally distinct from that which prevails in England. Taking Paris as an example, the registered public women

are compelled to live in particular houses, and the most stringent rules are enforced for the regulation of their conduct. The system is such as to almost destroy every remnant of lingering modesty and self respect, and the regulations are so tyrannical that few women will live in the registered houses unless they are absolutely compelled to do so by want or otherwise. This fact explains, what appears otherwise inexplicable, that, notwithstanding the great developement of prostitution in Paris, the number of registered public women is so small and almost stationary in amount. Prostitution is in France recognised as a necessity, and there is never any objection on the part of the police to authorise the opening of houses in what they consider proper localities. The stringency of the regulations under which the system is placed is, therefore, alone responsible for the large amount of secret as compared with open prostitution in Paris. It is evident that the same reason may be given for the slight decrease effected in veneral disease under the French system. Only the registered prostitutes are subject to periodical examination, and the smaller the proportion these bear to the whole number of public women the less effect must the medical treatment have over the gross amount of that disease. It is not proper, therefore, to bring as an argument against the efficiency of the Contagious Diseases Acts the failure, if it can be so called, of the system pursued in France. The conditions are almost wholly different, and the mere facts of registration and periodical examination alone being the same the results may well be very dissimilar.

It will be gathered from the previous pages that I am in favour of the retention of the Contagious Diseases Acts. At the same time it would, no doubt, be better if the same practical results could be obtained without State intervention, or least under such a system as that established under the original Act of 1864. The remarks on this subject made in the Report of the late Royal Commission deserve consideration. This Report says:—"Notwithstanding the summary period which was put to the Act of 1864, there is evidence . . . . . that if allowed fair-play it could work with vigour and efficiency. Of the witnesses who have appeared before the Commission in support of periodical examination, few were acquainted with the operation of the Act of 1864, and still fewer discriminated between what was due to that Act, and what to its successor. We were informed that under the voluntary system, as it was called (to distinguish it from the compulsory enactments of 1866) many of the women would not come to the hospitals, and if

they came they would not stay to be cured. The arrival of a regiment or of a ship would empty the Lock wards. One of the hospital surgeons stated that 25 per cent of the women went away before they were cured. The difficulty of detaining the women under the voluntary system is no doubt considerable; but their unwillingness to come to the hospital is inconsistent with the evidence given before the Medical Committee and the Comittee of the House of Lords of 1868. . . . . The Visiting Surgeon of the Portsmouth Lock Hospital, while insisting strongly on the necessity of periodical examination, admitted at the same time that 'those who came voluntarily, knowing themselves to be diseased, are a class much on the increase,' and we have heard of women from outside coming into the protected districts for the purpose of obtaining treatment in the hospital. The truth is, that the women are willing to submit to treatment when disabled by disease, but that under the voluntary system they leave the hospital upon any temptation from without, or even from mere weariness of confinement." (i. p. 14.) The Commissioners justly deduce from these premises that it would be to little purpose to provide hospital accomodation for diseased prostitutes, if they were to resort to such hospitals and to leave them at pleasure. But this fact must be received as proving the insufficiency of the voluntary system; since, as the Commissioners were assured, few women would voluntarily enter a Lock Hospital under the condition of having to remain there until discharged by the authorities. No doubt some of them would do so, but the proportion to those who refused would be small. Mr. Parsons, who is cited as being of opinion that the voluntary submission of women to detention is largely on the increase, adds that this is not sufficient. The Compulsory Act is required to oblige *all* public women to be examined, since the staying away of any of them would cancel the good otherwise done. (*Ques.* 10,782 seq.) The truth of this observation is evident. The detention of some women in hospital would make the calling of the rest more brisk, and, if diseased, they would spread the contagion more widely than they would otherwise do. The disease itself, moreover, would probably be of a more virulent type than though the women were regularly examined and treated in hospital. There is another consideration of very great importance, which appears to have been lost sight of by the Commissioners. They say that women are willing to voluntarily submit themselves to treatment when disabled by disease. It is not very evident what

is meant by "disabled," but by the light of certain facts mentioned by Mr. Berkeley Hill, the Out-Surgeon to the London Lock Hospital, the submission referred to is of much less value as an argument in favour of the voluntary system than would at first sight appear. Mr. Hill says that many women avail themselves of the hospital, but that they are very irregular in their attendance. The cause of this irregularity is that very few women attend until they are suffering considerable inconvenience. The alleviation of suffering and not the cure of the disease is their object, and many of them "are suffering in such wise, that by a few applications of medicines or lotions, they can be relieved from suffering for the time or permanently, but they are not cured of the disease." (*Ques.* 14,738.) It is evident that in these cases the voluntary system with compulsory detention would be useless, as the women would seldom apply for treatment at all. If they did apply, moreover, it would usually be only after they had suffered for a considerable period, and the disease had reached an advanced stage (*Ques.* 14,744) and been widely propagated.

But if "dealing directly with the disease," as provided for by the Act of 1864, cannot be expected to be efficacious, still less can it be assumed that the purely voluntary system would be so. There would be two influences at work, either of which would be sufficient to ensure its failure. Supposing voluntary hospitals to be established, the habits of the women to be received into them are such, that the treatment of venereal diseases could be attended with but comparatively slight results. We have already seen how irregular is their attendance at the London Lock Hospital, that irregularity being the great difficulty with which its conductors have to contend. Women often cease to attend when they are a little better, and even while under treatment they will continue their calling. This is so great an evil, that Mr. Berkeley Hill believes it would be better, as a matter not of charity but of public policy, not to treat prostitutes as out-patients; as they are relieved of their sufferings, and at the same time they are enabled to "go on with their avocation while they are still in a condition to communicate disease." (*Ques.* 14,741.) It should be remembered, moreover, that not only must the strictly voluntary system ever be one of simple charity, a fact which ensures its being less efficacious than the compulsory system of the Contagious Diseases Acts, but it is unavoidably no less objectionable from the high moral stand-point than the compulsory system. In the latter case, the object is preventative

rather than curative, the treatment of the disease in the woman being only subsidiary, although necessary, to the continuance in health of the man. Under the voluntary system, this prevention is never taken into consideration. The sole object is to treat casual cases of disease as they present themselves, the effect being the restoration of the female patient to a condition which enables her to return to her former calling. Moreover, if it is morally wrong to restore a woman to that condition of health which is necessary to assure freedom from disease to the men who associate with her, *for their benefit*, it must be equally wrong to do so for her own. Not only is the practical result the same in both cases, but it is known to be the same, and there is no such difference in the motives which influence the treatment under the two systems as to give one a moral supremacy over the other. Nor is the moral complexion altered by the fact that the compulsory system is that of the State whilst the other is simply conducted by private individuals. Whatever may be objected to the recognition by the State of prostitution, it is difficult to believe that anyone can seriously contend that it is wrong for the State to maintain institutions which it is an act of charity for individuals to support.

Moral considerations supply the second reason why the voluntary system of dealing with venereal diseases must fail. The neglect hitherto to provide hospital accommodation for the treatment of those diseases has not arisen from mere indifference. The Report of the Royal Commission says that private benevolence, which has made such ample provision throughout London, "for the cure or treatment of accident and disease of every other description, is unwilling to aid the sufferers from this particular malady." (*i. p.* 18.) And this is true of nearly all other towns. In few places is it possible to establish a voluntary Lock Hospital, or even to obtain a venereal ward in an hospital for the treatment of general diseases. The objection is to the nature of the disease, which, as originating from what in the eyes of the religious world is peculiarly immoral conduct, it is thought ought to be excluded from charitable treatment. In some cases, perhaps there is the further thought that the cure of the disease qualifies a prostitute for returning to her calling, and many persons would consider such a result as rendering them accessory to the sin. This is the great difficulty in the way of the maintenance of voluntary hospitals for the general treatment of venereal diseases by those who oppose the Contagious Diseases Acts on what are called high

moral grounds. Such persons cannot, as I have before shown, consistently with their own principles, facilitate prostitution by supporting an hospital for the simple cure of the disease it engenders. Their action must have a moral aim, and hence the only consistent plan for dealing with the physical evil would be for Lock Hospitals to be established in connection with refuges and homes. No doubt these would be very valuable adjuncts to such institutions, which would then be freed from the reproach that, as a rule, they exclude from their benefits the very cases which a true charity would be the first to welcome, as being the most in need of relief. But hospitals of that character would be very different from those which the opponents of the Contagious Diseases Acts desire to be established, and they would be almost useless for the purpose of stemming the current of disease.

For the reasons already stated, I do not see how the slightest faith can be placed in the efficacy of any voluntary system of treatment of venereal diseases, and I fully subscribe to the necessity of retaining the present compulsory Acts in force if such diseases are to be systematically dealt with. It by no means follows, however, that the system established by those Acts is perfect. It appears to me that various objections raised by their opponents might be removed without affecting their utility, and even with the contrary result. One objection on which much stress has been laid is the absence of a definition of the phrase "common prostitute." The want of it, Mr. Shaen thinks, brings many women who "are engaged ostensibly to a considerable extent in an honorable course of life, washerwomen, and sempstresses of various kinds, or wives who are dependent upon the work of their husbands, which is more or less uncertain, but who from time to time act like prostitutes," but who ought not to be classed as common prostitutes. (*Ques.* 19,545.) This objection, however, supplies its own answer; since if these women do not wish to be treated as prostitutes they need not act as such. and one of the great advantages derived from the Acts is that such clandestine prostitution has been in great measure prevented by the dread they inspire. Moreover, there can be no doubt that such women as those referred to by Mr. Shaen are common prostitutes in the strict sense of the term, although they do not wholly gain a living by the calling, and the Acts would be largely evaded and rendered useless if women of that character were excluded from their operation. Some distinction, however, might well be made between the regular and the occasional prostitute, and it would be advisable to provide that the latter should not be liable to be registered for periodical examination until she has been a certain number of times warned by the police, and then only after she has been found by a magistrate to be amenable to the Acts. This would be much better than attempting any definition of the term "common prostitute," the only result of which would probably be to defeat the intention of the legislature. It should, however, be made distinctly to appear, as Mr. Shaen suggests, that it is "the duty of the magistrate to be satisfied from the evidence that the woman is a common prostitute." (*Ques.* 19,564.) No doubt this is always done, but it would be better to amend section 16 of the Act of 1866, by directing that the magistrate must be satisfied on oath, not merely that the matter of the information is true, but of the truth of the charge that the woman is a common prostitute and of the other matters contained in the information.

Another objection to the present Act turns on the voluntary submission. Mr. Shaen, in his evidence before the late Royal Commission, stated that the great majority of cases of hardship under the Acts that he had heard of were where the voluntary submission had been signed in ignorance of its nature. (*Ques.* 19,572.) It can hardly be doubted that women have occasionally signed the submission in ignorance of its full consequences, and considering how serious those consequences are, every precaution ought to be taken against such an occurrence. It may, of course, be prevented by the submission being so worded that its true meaning and effect cannot be mistaken, and by ensuring that it shall be fully explained to the woman before she signs it. I am inclined to think, however, that the course suggested by Dr. Row is the only proper one, and that, on the first occasion of a woman being brought within the scope of the Acts, an information should *in every case* be laid before a magistrate (*Ques.* 1,869); the voluntary submission being reserved for future occasions, unless indeed the magistrate be allowed himself to accept a voluntary submission in the first instance.

Mr. Shaen points out a defect in the Acts relating to the certificate of health to be given to free a woman, after imprisonment, from the order subjecting her to periodical examination. The proof of this certificate is declared by the Act of 1866 to be on the woman, and by the subsequent Act of 1869 the certificate is directed to be delivered to the

inspector instead of to the woman herself, who is thus deprived of the means of proving it. The object of the provision in the Act of 1869 was to prevent a prostitute exhibiting a certificate of health for the purpose of her calling, but clearly if the woman has to prove the certificate it ought to be given into her custody. It is objected however that practically a woman possesses a certificate in the notice to attend for examination. (*Ques.* 19,584.) The objection to giving such a document to a woman who has duly entitled herself to it cannot have much weight with the supporters of the Contagious Diseases Acts, but, if thought advisable, the giving of the notice to attend could be so arranged that it should not be of any use as a certificate. At present it is given immediately after the preceding examination. This might be altered by giving the notice only a few days before the time for attending and by instructing the surgeon to retain it when the examination which it refers to has taken place. In this case a woman would have the notice in her possession for only a few days, and these being at the end of the fortnight which intervenes between the examinations it would not operate as a certificate of health.

The last alteration in the Act of 1866 which I would recommend, is the extension of the time within which a person may bring an action for anything done illegally under its provisions. Mr. Shaen pointed out that, instead of being given five months within which to bring the action as in ordinary cases, a woman has only two months for suing in respect of any illegal act under the Statute of 1866. Moreover, as the offence complained of would usually be false imprisonment, and the woman thus circumstanced could not sue until she was released, practically she would be debarred from bringing an action at all. (*Ques.* 19,586.) This might be remedied by extending the time for suing, but it would be better to make that time run only from the termination of the imprisonment, if this should be or follow the illegal act. There are several other points connected with the Contagious Diseases Acts which might be reconsidered; and perhaps the definition of "venereal diseases" might be somewhat altered, so as to remove from the operation of the Act the cases in which there is no contagion, as suggested by Mr. Wolferstan. (*Ques.* 3,089 seq.) If these alterations were made there would be little, if anything, left to complain of in relation to the working of the Acts themselves, and the objections to them would then be simply those of principle which I have sought to controvert.

Before concluding, I will refer shortly to certain other matters intimately connected with the question discussed in the preceding pages. The Report of the late Royal Commission, when referring to "the reclamation of fallen women effected through the agency of the hospitals and of homes and refuges in connection with or independent of those establishments," states that "this field of operation is not the proper province of Government." The Commissioners add that they "cannot recommend therefore that the care of the Government or of the hospital authorities, as regards the moral and temporal welfare of the women, except in the case of very young prostitutes, should be extended beyond the hospital." (i. p. 17.) A distinction is here made between very young and older prostitutes, and no doubt it is a just one in this relation. But the distinction ought not to be too sharply drawn. The welfare of the State depends so largely on the moral condition of its individual members, that the Government might well aid in the work of moral reformation, although not itself actively promoting it. This is done already to a certain extent in the carrying out of the Contagious Diseases Acts, but only consequentially and not as one of the direct objects of the Acts. It would be advisable, therefore, to expressly provide that, in addition to the treatment of disease, the reformation of the women detained in hospital shall be attempted, and that grants shall be made to the Homes which receive those who wish to lead a reformed life. These Homes should however be certificated; for it would be useless to send prostitutes to institutions partaking of the nature of the penitentiary. The great object to be sought in dealing with such women, is to restore or increase their self-respect, and this will be best attained by showing them that, debased as their past life may have been, it need not leave any permanent moral stain. The restoration of character is what prostitutes under the present condition of society feel to be almost hopeless, and their simple treatment as beings having ordinary human qualities and sympathies will go far towards inducing them to try to follow a different course of life, if facilities for doing so are supplied them. The religious element should be not too obtrusive, but above all there should be no undue restriction of personal liberty, the deprivation of which to women who have been accustomed to the freedom of a life of prostitution is irksome in the extreme. Of course, industrial training should be provided for the inmates of such an institution, of a character, however, fitted to their capabilities, and

the rudiments of education should be imparted to the ignorant. So far as they are consistent with the special objects of confinement in hospital, the regulations of such a Home might be applied to the inmates of the hospital itself. Great aid would thus be afforded in the progress of reformation, and women would afterwards the more readily avail themselves of the ordinary Home as a stepping stone to a regular course of life. A certificated Home itself should be required to deal with slight cases of venereal disease, the existence of which should be no bar to admittance within its doors. This is a very important point, since, as is said by Mr. Bulteel (who is in favor of a Reformatory Institution being attached to each Lock Hospital), until the Contagious Diseases Acts were in force reformation was very largely hindered by the constant refusal of admission to Homes of women who were diseased. (*Ques.* 5,843.) Mr. Bulteel adds that the reformation of prostitutes is under all circumstances a most discouraging work, as a very large proportion of them will return to their former life under the very mildest discipline. (*Ques.* 5,849.) No doubt this is so, and as the difficulty of reforming women must increase after they have pursued this calling a considerable period, it is of great importance that they should be dealt with at as early an age as possible. This opinion to a certain extent clashes with the fact that the extremely young prostitutes are as a rule very depraved. This is, however, their misfortune rather than their fault. It proves either that they have never had a moral training, or that they have been exposed to very great temptations at a period when the moral character is but slightly developed. They are prematurely immoral because they never really knew what morality is, and they should, therefore, receive exceptional treatment for the purpose of their reformation. The Report of the late Commission says on this subject, "Many of the witnesses who had practical experience stated that the least hopeful inmates of the Hospitals and Reformatories are young girls from 14 to 16 years of age. Many of these girls have lived in the streets from childhood, others have been sent to prostitution by their parents, and some have been driven to prostitution by sheer want. These poor outcasts can hardly be said to have exercised a discretion in following a career of vice, or to know the difference between right and wrong." The Report adds, "the casual offices, however earnest, of a hospital chaplain can be of little avail with children who require to be educated in the elements of moral and religious law. We think it desirable

that all female children under 16 years of age found in brothels, or houses of ill-fame, or brought up under the Vagrant Act, should be sent to a Home or an Industrial School, unless they can find securities to be of good behaviour." (i. p. 17.) This recommendation, extended however so as to apply to all girls of a certain age who are subject to the Contagious Diseases Acts, is in the true spirit of the beneficial legislation of our era. I am inclined to think, however, that girls of sixteen are too old to be thus dealt with, and that fifteen should be the limit beyond which no girl should be compulsorily placed in a Reformatory. The scope of the Industrial Schools Act might well be extended so as to make it apply to the case of juvenile prostitution and it would thus become a powerful instrument of moral good.

The influence of the compulsory detention of juvenile prostitutes as a preventive measure can hardly be overestimated. The ranks of adult prostitutes are largely recuited by girls who have been brought into contact with it from their earliest years. It is evident that if the sources of supply are cut off there must be a great reduction in the number of the class. But, although certain preventive measures may be enforced with advantage, it is difficult to frame them so as not to encroach unduly on the liberty of the subject. There can be found little further objection to the provisions of the Contagious Diseases Prevention Bill on this head. No good end, however, can be attained by inflicting a penalty on a person suffering a girl of sixteen to resort to a house or room for the purpose of prostitution, unless provision is made for the placing of such girls in a reformatory. The provision that a person shall be punished for carnally knowing a girl under fourteen years of age, *unless he is legally married to her* is a curious one. The assumption in the one case is that the girl is too young to have a proper knowledge of the consequences of the act to which she is a consenting party. But surely she must be equally ignorant in both cases, and consistency as well as common sense would require also that a girl should not be allowed to marry under the age of fourteen. Preventive measures of the character provided by Mr. Bruce's Bill will, however, do little of themselves to reduce the number of the class of those who lead a life of prostitution. Mr. Shaen, the solicitor to the association for the protection of women, made before the late Commission the extraordinary statement that, "supposing we were able to-day to remove by our Rescue Societies every prostitute that is in London, the only result would be

the rapid refilling of the class, all the tendencies towards prostitution remaining. The class would rapidly fill up again, and I am not sure on the whole, that it would not be a misfortune, because it would be passing through the houses of prostitution as large a class as possible of women." (*Ques.* 19,588.) If this be true, it exhibits a profound social depravity which must be dealt with by measures of a totally different character from those which Mr. Bruce's Bill provides. If the evil of prostitution is to be effectually dealt with, its sources must be traced out and fearlessly grappled with. The Report, which has been already considered, says on this subject:—"Much of the prostitution which exists is undoubtedly connected more closely with the pressure of want, and even actual destitution, than with unregulated passion; much arises from mere idleness, the love of dress, and the like; much also is to be traced to the character of the dwellings in which many of the poor are compelled to reside. These sources of the evil are such as can in some measure be dealt with; and it is to be hoped that greater attention to primary education and careful moral training, increased female employment, and improvement in the character of the houses which the poorer classes of the population inhabit, may diminish, though they cannot entirely prevent prostitution, as arising from such causes as those which we have cited. It is needless to add that in this case it is preeminently true that prevention is better than cure." (i. 19.) If instead of listening to the noisy opposition, founded on a misapprehension (to use the mild term of the Report) of the moral bearings of the question of prostitution, so highly deprecated by the Commission, and seeking to repeal Acts which admittedly have effected an enormous amount of good, Her Majesty's Government had sought to remove some of the causes of prostitution, they would have entitled themselves to the highest commendation, and not have laid themselves open to the just accusation of cowardice and irresolution. It is impossible that legislation which, as characterised by Sir J. Packington, is the triumph of prejudice and clamour over reason and truth, can be accepted by Parliament. So far from the Contagious Diseases Acts being repealed, it is much more probable that, their great value being more fully recognised, they will be extended, under proper conditions and with certain alterations of detail, throughout the kingdom. What Sir J. Salusbury Trelawny characterises as the most benovelent Act of the century cannot long be restricted in its operation to military and naval stations. Changes in some of its provisions

may be required by difference of circumstances in particular places, but its general principles are universally applicable and may reasonably be applied—at least when their aid is invoked—to combat the evils flowing from prostitution, and to rescue its unfortunate victims from their life of degradation and wretchedness.

A. Johnson, Printer, 20, Silver-Street, Hull.

REPORT

ON

INDIGENCE

AS A CAUSE OF THE

EPIDEMIC TYPHUS.

BY

W. TRENCH,

MEDICAL OFFICER OF HEALTH.

DECEMBER 9, 1864.

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REPORT.

The Medical Officer of Health having received directions from the Committee "to make inquiries from the local Charitable Societies and other sources, for information as to the extent of destitution among the class of persons above that of paupers as a cause of Fever," begs to submit the following Report:—

In order to rightly consider the question, there should be no mistake as to what is meant by the term "cause of fever." Typhus fever is of unknown origin; no combination of accidents will by themselves produce it, any more than they will produce measles, scarlet fever, small pox, or any other of the zymotics. Starvation, destitution combined with overcrowding in close mephitic apartments, weakness arising from overworked intellectual or bodily exertions, anxiety or mental distress may all produce functional or structural disease, but will not generate typhus, or any of the specific zymotics, if the germs of their contagion be absent. Yet all these influences, separate or united, are rightly called "causes of typhus;" for, just as in the vegetable world certain forms of fungus growth appear wherever the conditions which favour their existence are present, so, as a rule, typhus will spring up into manifest action whenever the peculiarities which encourage its growth are present.

I, therefore, understand the meaning of the word "cause" to be "promoter" of the spread of typhus. Typhus spreads by means of contagion; the cause of its spreading being the presence of susceptible persons. The question, therefore, is, how far the increased susceptibility, which constitutes an epidemic of typhus, is due to indigence? The term fever means the pure typhus, which is now epidemic among the people, and is distinct from the typhoid, which frequents the places where emanations from drains and other impu-

rities poison the air. This distinction requires to be borne in mind, because the causes of the two diseases and the hygienic remedies for their removal are different. With this explanation I proceed to lay before the Committee the facts from which I have concluded that typhus fever exists extensively among paupers and the class above paupers, and that the chief cause of that excess of typhus is indigence.

I might almost have assumed as an admitted fact that typhus prevailed extensively not only among paupers but among those beyond the pale of parochial relief, but I prefer to lay before the Committee the grounds upon which this opinion is based.

1st.—The average number of fever cases at one time in the Workhouse Fever Hospital during 1860—the year before the fever became epidemic—was twenty-two; the average number during the last two months about 350.

2nd.—The statement of Mr. Carr, the Governor of the Workhouse, that the majority of the fever patients in the hospital at present are not what is generally considered paupers.

This statement has been confirmed at the Health Committee by Mr. Councillor Whitty, who is also a member of the Select Vestry.

3rd.—The tabulated daily reports of the House-to-House Inspectors showed long since that typhus was not confined to the pauper class.

4th.—It is in accordance with my own personal observations. During the earlier months of the spring and summer, when the character of the epidemic was rendered somewhat doubtful by the frequent entries of deaths as "gastric" or "typhoid fever," and when, therefore, it was possible that the exciting cause might be emanations from drains or other impurities, I weekly visited, with an inspector, all the houses where death from fever was reported to have occurred. I have within the last three months visited many hundred streets, courts, and alleys. The visits were not paid casually but systematically, and for the twofold purpose of examining the condition of the people as to health, and determining the improvements required to mitigate sanitary evils. These visits showed me that the ravages of the fever extended largely among the class above parochial pauperism.

The next point of enquiry is to determine whether indigence exists among the ranks of the people above the class of paupers.

Let me remind the Committee that, in a sanitary point of view, it is immaterial whether its existence, if proved, be due to material or moral causation. It may have originated in idleness, drunkenness, improvidence, trade strikes and combinations, or any of the many irregularities which swell the catalogue of social evils, yet its effects will be the same as those produced by unavoidable poverty accruing from the wants of labour or the lowness of wages. The habitual drunkenness of the parent among the labourer class will be, in nine cases out of ten, even where the wages are good, equivalent to indigence as respects the children. I take for granted that all will admit the existence of a certain amount of destitution and indigence among the artisan and labourer class at all times. The question is simply, has it been greater than usual, or to any such extent as to justify us in regarding it as a chief cause of fever? and if it exists at all, among what classes does it do so?

The statistics of private benevolence are exceedingly interesting on this point. In 1863, the then three great charitable societies were amalgamated into one body called the Central Relief Society. Its sixth rule provides that relief shall not be granted to persons receiving parochial assistance, but in extreme exceptional cases; so that it may be safely inferred that it is chiefly extended to persons somewhat different or removed from the pauper class. The amount of relief given from June 25 to December 10, 1864, was within a few pounds double that dispensed during the same period and the same number of days in 1863; the number of persons relieved was 1,061 more in the same months of 1864 than in those of 1863. The soup kitchens, which were not opened at all during December, 1863, were opened this year on the 5th instant, and had to the 17th dispensed 4,261 quarts of soup. In addition to the usual sago soup, the Society now dispenses a meat soup prepared from beef, with peas and proper seasoning ingredients. So far the operations of the Society imply that there have been more calls on the exercise of their charity during 1864 than in 1863.

The following is an analysis of a Visitor's Report Book from the 2nd December to the 16th inclusive, sent up to my office as an illustration of the Society's proceedings:—The number of persons relieved under his directions was 135, of whom 92 were males and 43 females. Of the males, 35 were tradesmen and 57 were labourers.

Of the tradesmen, 18 applied for relief on account of want of work, and 17 on account of sickness.

The nature of the sickness is not always mentioned, but 8 of the cases are stated to have been from fever, and in 4 of these the whole family had been attacked. Of the labourers 36 applied for relief on account of want of work, and 21 from sickness, of which 4 cases are mentioned as from fever, but no particulars stated. Of the 43 females, 16 applied for relief on account of want of work, 6 from having no means of living, 3 from insufficiency of means, 2 from being prevented from going to work on account of nursing sick relations, 16 from sickness; of the nature of the sickness 4 are said to have been from fever, and one case is mentioned where the whole family were sick from fever.

As the spreading of typhus fever in a family is an excellent test of the existence of some permanent cause increasing the susceptibility of the inmates of the house to its attacks, I requested that one of the Visitors might be directed to give me a list of cases reported upon by him during the last half-year where fever attacked two or more of the family, and also to specify any circumstances affecting the family or dwelling-place which at the time might have been remarked upon as accompanying the fever.

The following is an analysis of the Visitor's Report:—385 persons in 96 families suffered from fever. Attached as a memorandum to 56 of these families is the entry "very poor;" to 21 "foul air" (but without any mention of "very poor"); to 1 "overcrowding;" to 2 "dirty habits;" to 1 "drunkenness;" and to 15 no remark is made.

Of the 56 families described as very poor two have the additional entry "overcrowded;" 13 "drunkenness;" 24 "foul air;" 17 no remark.

All these families were, no doubt, in that degree of indigence which justified the relief given by the Society, and I, therefore, understand the entry "very poor" to mean exceptionally so.

It has not been in the power of the Medical Officer to obtain any reliable data of the comparative operations of charitable societies during 1862 and 1863.

At the very time when the disbursements of the Central Relief Society were being enlarged, those of the Parochial Board were being reduced. A decrease of out-door relief occurred contemporaneously

with increase of the deaths and fatal fever cases in the borough. This curious circumstance had deeply impressed me, when, in January, I first became acquainted with it. I knew that the Vestry were guided by kindliest feelings to the poor, and I, therefore, felt convinced that parochial relief could not accurately pourtray the extent of public indigence. In reference to this subject, I obtained, in conversation with a person who is conversant with such questions, the following fact in connection with his experience:—A long and unsuccessful strike of the journeymen builders had reduced them and their families to great distress. Pride kept them aloof from either private or parochial charity. They clemmed and sickened. Their inevitable condition had been reasoned out into reality by my informant and others, who knew a certain large amount of wages must, by the enforced idleness of the workers, have been lost to numerous families. They found that this loss was not reflected in the out-door expenditure of the parish. Agents of charity were sent out in search of the sufferers, and it was only by asking at all the bakers and small provision dealers of certain districts where the operatives were known to live, for the names of customers who in the latter weeks of the strike had ceased or lessened their purchases, that they were able to track down the indigence. Now, I ask the Committee to apply this fact to the case of sufferers from typhus. This disease is especially fatal to the workers—the heads of families. I showed, last Thursday, that between the ages of 20 and 60 494 more persons had died from fever in 1863 than in 1862. The disproportion between 1864 and 1863 is still greater, for during this year the fatality has increased. I won't recapitulate my estimate of the pecuniary loss to the surviving families by this sickness. I am content to ask practical men to reason on it in the same manner as they would on the pecuniary losses caused by the enforced idleness of strikes. The money loss not being reflected in the parochial expenditure does not negative its existence; it only shows that it was not felt by the pauper class, and that it must have been sustained by labourers' families who were averse to receive the visits of the relieving officer. I have spoken of the loss of wages occasioned by epidemic fever and trade strikes as economically similar, but there is this distinction—the loss from strikes is temporary, and dependent on the stubbornness or endurance of the people; that from typhus is too frequently total.

Although the expenditure of the Workhouse showed no increase of pauperism or indigence, the position of the inmates of its Fever Hospital does so most conclusively. I have previously mentioned that the number of hospital patients had greatly increased, and I have, on the authority of Mr. Carr, confirmed by Mr. Whitty, mentioned the fact that the greater number of these persons were of a rank above paupers. Now, it may be asked, was there among this class any evidence of indigence having preceded fever? Mr. Carr assures me that, though familiar with the appearance of the people during the Irish famine fever, he considers the general condition of the patients this year, as regards clothing, to be exceptionally bad. He has thereon appealed to the charity of the benevolent for help to dispense clothes to the half-naked convalescents on their leaving. The subject was brought before the Vestry Board, when Mr. Whitty, recognising the truth of Mr. Carr's description, proposed that help in clothing should be given at the public expense. The conclusion which I drew from these facts appears to me unanswerable. Large numbers of the labouring class are found in a Workouse Fever Hospital. The reluctance with which these people permit any parochial interference with their affairs, and the dislike with which they regard the possibility of being inmates of a Workhouse, first suggests the idea that there must have been the pressure of unusual distress at home. Their clothes are seen by the Governor to be so exceptionally bad, that he appeals to the benevolent for aid in their behalf. Their ragged insufficient clothing indicates that the indigence was of long continuance; for it is in matters of less essential necessity than daily bread that the pinch of poverty first shows itself. The above facts form to my mind a chain of evidence consecutive and conclusive to prove that typhus has been epidemic in Liverpool not only with the pauper class, but with a class of persons above that of paupers, and that among them indigence preceded fever, so as to point to it as a principal cause of its epidemic prevalence.

Some think that a careful analysis of the antecedent history of all those who have died of fever will show its cause, and that, although it might be troublesome and laborious to obtain, it must be truthful in its teaching. I believe that that would be the case if the various histories over a sufficient length of time were collected by an intelligent person unconnected with the duty of reasoning on

the facts; for though there would be many errors in such histories, yet the law of averages would balance exaggeration and suppression sufficiently closely to bring the whole to approximate truth. But let me remind anyone who enters on this investigation that there are many difficulties which will require to be solved before his deductions can be received. Deaths are relative to attacks of disease, but in rates varying according to age, social position, and other circumstances. Typhus, which is seldom fatal in youth, will rise to a death rate as high as 40 per cent. in more advanced age, and, therefore, a death during adolescence will represent many more cases of fever than one occurring in advancing age. There are also great differences due to social position, and it is held by many that the death rate of paupers from this disease is wonderfully less than that of persons in easy circumstances. I am not aware whether there are any statistics in existence from which a formula could be obtained to work out the causation of epidemic disease from the antecedent histories of the dead, but I am sure that a history of the antecedents of typhus patients would be of great value, and that after a time their study would lead to important results. The difficulty would arise from the repugnance of most people to speak candidly on their own circumstances, or of the habits and failings of the dead.

Husband (dead), and 2 children	Very po
Husband and wife	
Mother and daughter	Very po
Father and 2 children	Very po
Father and 2 children	Very po
Husband wife, and 2 children	Very po
Husband, wife, and 4 children	Very po
Husband, wife, and 4 children	Very po
Husband, wife, and 2 children	
Husband (dead), wife, and 1 child	Foul ai
Husband, wife, and 2 children	Very po
Husband, wife, and 2 children	Foul ai
Husband and 2 children	Very po
Husband (dead), wife, and 1 child	Foul ai
Husband and 7 children	Very po
Husband, wife, and 2 children	Very p
Husband and 2 children	Foul ai
Grandmother and mother (dead), and 3 children	Foul ai
Husband and 2 children	
Husband, wife, and 2 children	Foul ai
Husband, wife, and 2 children	Foul ai
Husband, wife, and 4 children	Foul a
Husband, wife, and 6 children	
Husband and 2 children	Very p
Husband, wife, and 2 children	Very p
Husband, son, and lodger	Dirty
Husband and wife	Dirty,
Three children	Dirty,
Father and two children	
Two daughters	Foul a
Husband (dead), wife, and 4 children	
Father and 1 child	
Husband (dead), wife, and 6 children	Foul a
Husband, wife, and 5 children	Foul a
Father and 2 children	Overcr
Husband, wife, and 6 children	Foul a
Husband, wife, and 5 children	Foul a
Husband, wife, and 1 child	Foul a
Husband, wife (dead), and 4 children	Foul a
Two children	Bad ve
Mother and 2 children	Very I
Father and 2 children	Foul a

Extracted from Visitor's Reports.

Mother [illegible]	[illegible]
Husband Blackwell	8 Court, Llewellyn-street, 7 h.
Husband Denning	4 Court, Llanrwst-st., 11h.
Husband [illegible]lly	2 Court, Ashton-street, 4 h.
Three [illegible]sley	24, Gore-street.
Husband [illegible]unroe	2 Court, Combermere-st., 3 h.
[illegible] Kirke	7, Richard's-place, Cotter-st.

LIVERPOOL CENTRAL RELIEF SOCIETY.

CASES REPORTED UPON BY ONE OF THE VISITORS DURING THE HALF-YEAR ENDING TWENTY-FIFTH DECEMBER, 1864, WHERE FEVER WAS DISCOVERED IN TWO OR MORE OF THE SAME FAMILIES.

Persons ill of Fever.	Circumstances affecting Family or Dwelling-place.	No. in Visitors Report Book.	Applicant Visited.	Residence.
Husband and wife	Bad ventilation and foul air	3358	Mary Woods	2 Court, Newsham-st., 3 house
Two children	Bad ventilation and very poor	3396	Catherine Narey	56, Summer-seat, cellar
Husband, wife, and six children		3401	Henry Deane	16, Lancaster-st., Kirkdale
Husband, wife, and two children	Overcrowded and very poor	3506	Eliza Montgomery	20, Westmoreland-street
Mother and two children	Overcrowded, bad cellar, and very poor	3522	Alice Fallows	66, Titchfield-street, cellar
Mother and four children	Very poor	3533	Thomas Tolmaer	4 Court, Wakefield-st., 22 house
Husband (dead) and wife	Bad ventilation and foul air	3554	Margaret Kennedy	10 Court, Oriel-street, 5 house
Husband (dead), wife, and daughter	Bad ventilation and foul air	3559	Margaret Gibbins	3 Court, Limekiln-lane, 2 house
Husband, wife, and 1 child	Bad ventilation and foul air	3560	Mary Duggan	3 Court, Limekiln-lane, 1 house
Husband, wife, and 6 children	Very poor	3574	Richard Parry	35, Baptist-street
Husband (dead), wife, and 1 child	Very poor and of drinking habits	3621	Susan Webster	24, Robert-street, T.P., cellar
Husband and wife (dead), and 1 child	Very poor, of drinking habits, and foul air	3627	Hannah Grace	16 Court, Combermere-st., 5 h.
Husband, wife, and 2 children	Very poor	3653	Robert Henry	35, Gt. Richmond-st., cellar
Husband, wife, and 2 children	Bad ventilation and foul air	3660	Thomas Kidd	8 Court, Naylor-street, 4 house
Husband, and 3 children	Dirty habits	3681	John Barlow	9 Court, Bostock-street, 2 h.
Husband, wife, and 2 children	Very poor	3682	Ann Irvine	31, Bostock-street, cellar
Husband (dead), wife, and 2 children	Very poor, and of drinking habits	3685	Charles Foulkes	7 Court, Grenville-street, 1 h.
Three children	Very poor	3949	Ann M'Kenna	4 Court, Trowbride-st., 4 h.
Husband (dead), wife, and 4 children	Foul air, and very poor	3834	Eliza Woodyer	10 Court, Kew-street, 1 cellar
Husband, wife, and 2 children	Bad ventilation and foul air	3908	Alexander Malam	279, Bedford-st., T.P., cellar
Husband, wife, and 3 children	Very poor, and of drinking habits	1719	Henry Metcalf	21, St. Andrew-street
Husband, and 2 children	Bad ventilation and foul air	1737	Patrick Doherty	24, Jordan-street, cellar
Husband (dead), wife, and 2 children	Bad ventilation, and very poor	1803	Mary Murphy	3, Milton-street
Husband, wife, and 4 children	Foul air and very poor	1862	Andrew Cumming	13 Court, Heath-st., T.P., 6 h.
Mother, and 4 children	Foul air, drinking habits, and very poor	1864	John Lashley	3 Court, Combermere-st., 3h.
Father, and 2 children	Very poor	1890	Robert Hill	3 Court, Bostock-st., 2 house
Husband, wife, and 2 children	Foul air, drinking habits, and very poor	1929	John Dwerryhouse	2 Court, Combermere-st., 3 h.
Husband, wife, and, 1 child	Very poor	1931	Donald Cameron	6, Combermere-street
Husband, wife, and 2 children	Foul air, and very poor	1970	John Meredith	6 Court, Woodstock-st., 4h.
Husband (dead), wife, and 2 children	Foul air and bad ventilation	1986	Harriet Jevons	17 Court, Finch-street, 7 h.
Husband, wife (dead), 1 child, and aunt (dead)	Foul air and bad ventilation	1993	Agnes Thompson	20 Court, St. Andrew-st., 6h.
Husband and wife (dead), and 2 children	Very poor	1998	Elizabeth Sinnett	19, Watkinson-street
Husband, wife, and 2 children	Bad ventilation, and very poor	2036	James Chisnell	26 Court, Charters-st., 1 house
Husband, wife, and 2 children		2056	Samuel Hughes	35, Mann-street
Husband and wife		2118	John Lunt	65, Gascoyne-street
Mother and six children	Very poor	2146	Ellen Green	3, Franceys-street
Husband, wife, and 1 child	Foul air and bad ventilation	2160	Alice Vallaley	20, Gascoyne-street, cellar
Mother and three children	Very poor	2161	Sarah Bell	43, Gascoyne-street
Mother and 1 child	Very poor	2179	Mary Edgecomb	15, Wolfe-street
Husband, wife, and 4 children	Bad ventilation	2195	Evan Owens	31, Gore-street, cellar
Husband, wife, and 2 children	Bad ventilation and foul air	2248	Louis Taylor	96, Athol-street, cellar
Husband and wife (dead), and 2 children		2294	Hamilton Poole	2 Court, Litherland-alley, 1 h.
Husband and wife (dead), and 4 children	Very poor, drinking habits, and foul air	2311	Joseph Price	3 Court, Crump-street, 7 h.
Husband and wife (dead)	Very poor, and foul air	2312	John Verdon	17 Court, Robert-street, 1 h.
Mother and daughter	Very poor, and foul air	2368	Elizabeth Gardner	3, Court, Crump-street, 7 h.
Husband, wife, and 3 children	Very poor	2378	David Blackwell	8 Court, Llewellyn-street, 7 h.
Husbaad and wife		2383	Benjamin Denning	4 Court, Llanrwst-st., 11h.
Husband, wife, and 3 children	Very poor	2446	Myles Kelly	2 Court, Ashton-street, 4 h.
Three children (1 died)	Very poor	2447	Ellen Brisley	24, Gore-street,
Husband and wife (dead), and 5 children	Very poor, and foul air	2460	Hector Munroe	2 Court, Combermere-st., 3 h.
Three children	Very poor	2462	Mary Ann Kirke	7, Richard's-place, Cotter-st.

SOCIETY.

CAS YEAR ENDING TWENTY-FIFTH
OF THE SAME FAMILIES.

	nt Visited.	Residence.
Husban	eds.....	2 Court, Newsham-st., 3 house
Two ch	Nancy	56, Summer-seat, cellar
Husban	ane	16, Lancaster-st., Kirkdale
Husban	ntgomery ...	20, Westmoreland-street
Husban	ows	66, Titchfield-street, cellar
Mother	Tolmaer	4 Court, Wakefield-st., 22 house
Mother	Kennedy ...	10 Court, Oriel-street, 5 house
Husban	Gibbins ...	3 Court, Limekiln-lane, 2 house
Husban	gan	3 Court, Limekiln-lane, 1 house
Husban	arry	35, Baptist-street
Husban	bster.....	24, Robert-street, T.P., cellar
Husban	race	16 Court, Combermere-st., 5 h.
Husban	eary	35, Gt. Richmond-st., cellar
Husban	idd	8 Court, Naylor-street, 4 house
Husban	ow	9 Court, Bostock-street, 2 h.
Husban	e	31, Bostock-street, cellar
Husban	oulkes	7 Court, Grenville-street, 1 h.
Three c	enna	4 Court, Trowbride-st., 4 h.
Husban	odyer.....	10 Court, Kew-street, 1 cellar
Husban	r Malam ...	279, Bedford-st., T.P., cellar
Husban	tcalf	21, St. Andrew-street
Husban	oherty	24, Jordan-street, cellar
Husban	rphy	3, Milton-street
Husban	Jamming ...	13 Court, Heath-st., T.P., 6 h.
Husban	hley	3 Court, Combermere-st., 3h.
Mother	ill	3 Court, Bostock-st., 2 house
Father	erryhouse ...	2 Court, Combermere-st., 3 h.
Husban	ameron	6, Combermere-street
Husban	edith	6 Court, Woodstock-st., 4h.
Husban	evens.....	17 Court, Finch-street, 7 h.
Husban	ompson.....	20 Court, St. Andrew-st., 6h.
Husban	Sinnett.....	19, Watkinson-street
Husban	imell.....	26 Court, Charters-st., 1 house
Husban	Hughes	35, Mann-street
Husban	rt.....	65, Gascoyne-street
Mother	en	3, Francys-street
Husban	Haley	20, Gascoyne-street, cellar
Mother	ell.....	43, Gascoyne-street
Mother	ecomb	15, Wolfe-street
Husban	ens.....	31, Gore-street, cellar
Husban	ylor.....	96, Athol-street, cellar
Husban	Poole	2 Court, Litherland-alley, 1 h.
Husban	rice.....	3 Court, Crump-street, 7 h.
Husban	son.....	17 Court, Robert-street, 1 h.
Mother	Gardner ...	3, Court, Crump-street, 7 h.
Husban	ackwell	8 Court, Llewellyn-street, 7 h.
Husban	Denning ...	4 Court, Llanrwst-st., 11h.
Husban	elly	2 Court, Ashton-street, 4 h.
Three	ley	24, Gore-street,
Husban	aurce.....	2 Court, Combermere-st., 3 h.
	Kirke	7, Richard's-place, Cotter-st.

Husband, wife, and 1 child				
Husband (dead), and 2 children	Very poor, and foul air	2559	John Clarey	41, Hornby-street, cellar
Husband and wife		2562	Robert Guy	7, Epsom-street, cellar
Mother and daughter	Very poor, and foul air	2664	Amelia Kaye	14 Court, Dryden-st., 10 house
Father and 2 children	Very poor, and foul air	2688	Samuel Whitworth	14 Court, Paul-street, 4 house
Father and 2 children	Very poor	2846	John Durr	1 Court, Gascoyne-st., 2 house
Husband wife, and 2 children	Very poor, and foul air	2847	John Paris	11 Court, Oriel-street, 4 house
Husband, wife, and 4 children	Very poor, and foul air	2857	John Moyle	10, Hook-street
Husband, wife, and 4 children	Very poor, and bad ventilation	2966	Peter M'Cabe	107, Hornby-street
Husband, wife, and 2 children		2979	Joseph English	20, Birkett-street
Husband (dead), wife, and 1 child	Foul air, and bad ventilation	3143	Eliza Handley	145, Upper Mann-street
Husband, wife, and 2 children	Very poor, and foul air	3151	William Wedgwood	14 Court, Harding-street, 5 h.
Husband, wife, and 2 children	Foul air	3196	Thomas Wainwright	140, Blenheim-street, cellar
Husband and 2 children	Very poor, and bad ventilation	3229	William Burton	7 Ct., Mann-st., 13 h. in corner
Husband (dead), wife, and 1 child	Foul air, and bad ventilation	3323	Ann O'Hara	25, Newhall-street, cellar
Husband and 7 children	Very poor, and of drinking habits	3325	Peter Booth	14, Back Parliament-st., T. P.
Husband, wife, and 2 children	Very poor	3583	John Finley	7, Gascoyne-street
Husband and 2 children	Foul air	3588	Thomas Schooler	28, Court, Bond-street, 3 house
Grandmother and mother (dead), and 3 children	Foul air, and very poor	3647	Elizabeth Thomas	6 Ct., Pembroke-st., h. in corner
Husband and 2 children		3752	Catherine Singleton	57, Pitt-street
Husband, wife, and 2 children	Foul air, and bad ventilation	3761	Philip Anderson	81, Upper Mann-street, cellar
Husband, wife, and 2 children	Foul air, and bad ventilation	3766	Stamper Greenup	2 Court, Combermere-st., 10 h.
Husband, wife, and 4 children	Foul air, and bad ventilation	3768	Henry Wilkinson	1 Court, Jones-street, 4 house
Husband, wife, and 6 children		3827	Archibald M'Lauchlan	2, Back Castle-street, Kirkdale
Husband and 2 children	Very poor, and bad ventilation	2905	Michael Murphy	42, Harding-street, Windsor
Husband, wife, and 2 children	Very poor, and bad ventilation	2938	John Birmingham	2, Abstinence-street, T. P.
Husband, son, and lodger	Dirty habits, and bad ventilation	2944	William Lambert	145, Upper Mann-street, cellar
Husband and wife	Dirty, drinking habits, and bad ventilation	2948	Joseph Bithell	39, Harper-street, T. P.
Three children	Dirty, drinking habits (parents) very poor	3040	Charles M'Quillan	2, Abstinence-street, cellar
Father and two children		3041	Patrick O'Neill	2, Brunswick-street, T.P.
Two daughters	Foul air	3042	Joseph Earidge	31, Robertson-street, T.P.
Husband (dead), wife, and 4 children		3124	Ellen Bisbane	8, Great Oxford-street, Cellar
Father and 1 child		3165	William Deane	4, Great-Homer-street
Husband (dead), wife, and 6 children	Foul air, bad ventilation, and very poor	3169	Mary Singleton	1, Johnson-place, Torbock-st.
Husband, wife, and 5 children	Foul air, drinking habits, and very poor	3220	James Sargeant	7 Court, Oakes-st., 14 house
Father and 2 children	Overcrowded, and bad ventilation	3254	James Sudlow	20, Newington, cellar
Husband, wife, and 6 children	Foul air, and very poor	3282	George Critchley	3 Court, Naylor-street, 6 house
Husband, wife, and 5 children	Foul air, and very poor	3777	Michael Lyons	6 Court, Gascoyne-st., 2 house
Husband, wife, and 1 child	Foul air	3800	George Marsden	28 Court, Hornby-street, 12 h.
Husband, wife (dead), and 4 children	Foul air, drinking habits, and very poor	3801	Charles Foulkes	7 Court, Grenville-st., 1 house
Two children	Bad vent., drink. habits (parents), very poor	3300	Hugh Wignall	18, Moss-st., Nethrfld-rd., cellar
Mother and 2 children	Very poor	3355	Ann Pritchard	249, Athol-street
Father and 2 children	Foul air, and very poor	3357	Frances Fenna	4 Court, Dalrymple-street, 2 h.

Extracted from Visitor's Reports.

EDWARD HEATH, SECRETARY.

REPORT

ON THE

35TH SECTION

OF THE

PUBLIC HEALTH ACT, 1866.

BY

W. S. TRENCH, M.D.,

MEDICAL OFFICER OF HEALTH FOR THE BOROUGH.

PRINTED BY ORDER OF THE HEALTH COMMITTEE.

LIVERPOOL:

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1866.

PUBLIC OFFICES, 2, CORNWALLIS STREET,

Medical Officer of Health's Department,

Liverpool 16th August, 1866.

29th and 30th Victoria, cap. 30, Section 35.

The Medical Officer of Health begs to report to the Health Committee that, by the 35th section of "The Public Health Act," it is required that application be made to one of Her Majesty's principal Secretaries of State, by the nuisance authority of the borough, in order that the Secretary of State may, by notice to be published in the *London Gazette*, declare that enactment which refers to the registration and regulation of sublet houses to be in force within the district of the said nuisance authority.

After that formality has been complied with, the Medical Officer of Health purposes, with the consent of the Health Committee, to commence the application of the enactment in those streets, the houses of which have already been found by the Inspectors to be continually overcrowded, viz.:—Cavendish Street, Milton Street, Sawney Pope Street, Addison Street, and Hodson Street. He will add to the list, from time to time, the houses in other streets which have been or shall be found overcrowded.

As the practical working of the enactment is new and so far experimental, it will, in his opinion, be prudent at first to make its application restrictive and tentative, and therefore he will work both the registration and inspection with the present staff attached to his office. The regulations for which he will have to ask the authority of the Health Committee and the Council are as follows :—

1st. Whenever it shall appear to the Medical Officer of Health desirable that certain houses, let in lodgings or occupied by members of more than one family, should be placed under the regulations made by the Council for the well ordering of the said houses, in accordance with the provisions of the Sanitary Act, 1866, he shall notify the same by printed circular to the owners or tenants of such houses, and shall keep in a book for that purpose, a register of all such houses, with the cubical measurement of the several rooms of each house.

2nd. The Medical Officer of Health shall cause to be forwarded to the chief or landlord's tenant of each house a printed ticket, stating the number of persons allowed to sleep in each room of such house.

The principle which is to direct this allotment of residents in rooms will be as follows :—Whenever there is in a house a separate sitting room, not occupied as a sleeping apartment during the night, the number of persons allotted to the sleeping rooms of such houses shall be fixed on a basis of 300 cubical feet for each adult, whenever all the rooms in a house are used as sleeping apartments, the number of persons who may occupy such rooms shall be fixed on a basis of 350 cubical feet for each adult.

3rd. The Medical Officer of Health shall cause to be forwarded to the chief or landlord's tenant of each house, on the registration of such house, a printed circular, containing the following regulations to be observed by the tenants of such house, viz. :

The landlord's tenant shall cause the floor of each and every room of such house to be well and sufficiently swept at least once in each day, before the hour of 12 o'clock noon ; and shall cause the windows of each and every sleeping room

in such houses to be and continue open to the full width thereof for one hour, morning and evening, unless prevented by tempestuous weather, or the illness of any inmates of such room ; and shall cause the floors of all inhabited rooms in such houses to be washed at least once a week.

The owner or agent shall cause the walls and ceilings of every room in such houses to be well and sufficiently cleansed and limewashed, at least twice in every year ; and whenever it shall appear that he has complied with the above regulation, and the house is nevertheless in a filthy condition, then the chief tenant shall cause the walls and ceilings to be well and sufficiently limewashed. The enforcement of the above regulations shall be provided for by penalties not exceeding forty shillings, for any one offence, with an additional penalty not exceeding twenty shillings for every day during which a default in obeying such regulations may continue.

If the Council authorize the above regulations, they will have to be confirmed by the Secretary of State before being put in force.

The Medical Officer of Health begs to assure the Committee that he will use his best endeavours to give practical efficiency to the provisions of this enactment ; but experience has with him long since dispelled the hopeful illusion, that mere statutable laws, however stringent or honestly enforced, or mere sanitary inspections, however regular or continuous, will be able by themselves to check the evils of overcrowding in this large community. He may, therefore, at the commencement of putting into operation a new and experimental system of legislation, be allowed to reiterate opinions formerly enunciated ; firstly, that all efforts of the Council and its Officers to check overcrowding, and regulate the sanitary condition of sublet houses, will be a failure, unless systematically and

loyally sustained by the co-operation of the owners and agents of such property; secondly, that as the overcrowding of houses in any locality is a permanent menace and danger to the public health, so it is the duty of the public not to rest content with passive criticism of the efforts of the Council to reform the hygienic condition of the people; but by combined and individual exertions, and at some risk of capital, to increase the house accommodation so urgently required by the working classes of the town.

Especially he would appeal in this matter to the generous and wealthy philanthropists, to whom Liverpool is largely indebted for many noble works—its drinking fountains, its playgrounds and gymnasiums, its trained nurses, its schools, churches, and those institutions of exalted and catholic beneficence where it is the high privilege of medical science to aid humanity in the mitigation of disease. Nothing is more patent to his mind than that neither law nor lecturing will be able, successfully, to cope with the moral and physical evils of overcrowding; and that the best and most effectual remedy will be found in providing better houses for the labouring classes, and thereby carrying into their midst the practical teaching by example. There exists in London a society for improving the condition of the labouring classes, of which the estimable Lord Shaftesbury is the chairman of the committee of management. In a former report on the lodging houses of the metropolis, the Medical Officer endeavoured, very inadequately, to describe some of the many successes of this society; but there is one feature in its constitution which might with much advantage find a response in Liverpool. The society assists, by the experienced advice of its members, in the formation of county, parochial, and district associations, and corresponds with clergymen and others disposed to co-operate in their respective

localities in the formation of such associations for improving the dwellings of the poor. Now as Christian associations, or church and chapel congregations, under the teaching of ministers of religion, exist in all towns, and in none more happily united in good works than in this, it seems not unreasonable to believe that here we have a natural and ready formed machinery to this desirable end. Already such associations have their clergy, their schoolmasters, their district visitors, their Dorcas and sick clubs working systematically together in charity and religious teaching among the poor, and it will be only an extension of true missionary labour to promote, according to their wealth, the objects contemplated by the London society for improving the condition of the labouring classes. Liverpool presents a peculiarly appropriate field for such labour. It would not be difficult to obtain for purchase or long lease, on easy terms, very many bad courts, admirably suited for the same experiment of renovation that was carried out in Wild Court and Tyndall's Buildings in London—the former of which now yields £5 12s per cent. per annum on the total investment. Such renovated courts, under the wholesome moral discipline of a clergyman and his lay assistants, would be oases in the moral desert, and their example would in time tell for good on the surrounding neighbourhood. They would have this further advantage; ladies could there visit the poor without danger of receiving offence, and without any shock to their modesty and sensibility; for the rules of the society require the resident superintendent to keep a list of all the members of the families, to insist on home cleanliness, on ventilation of apartments, and on the absence of overcrowding and its abominable concomitants. If it were not out of place I could dwell more at large on this subject. I could picture every church and chapel with its social missionary district, small or large according to the subscrip-

tions or offerings of its members, with its model cottages, its improved model lodging houses, its wash houses, and its reading room for social and intellectual improvement, Even while I write I feel that many will regard the scheme as utterly Utopian ; but we have before us this pregnant fact—Liverpool is surpassingly rich, and Liverpool's death rate this week is 53 in the 1000, and the great primary cause of the sickness of Liverpool is the overcrowded and squalid condition of the homes of its working classes.

W. S. TRENCH,
MEDICAL OFFICER OF HEALTH.

WORKING MEN'S DWELLINGS

IN

LIVERPOOL.

BY

WILLIAM S. TRENCH, M.D.
MEDICAL OFFICER OF HEALTH,

AND

CHARLES BEARD, B.A.
MINISTER OF RENSHAW-STREET CHAPEL.

LIVERPOOL:
ADAM HOLDEN, CHURCH STREET.
1871.

WORKING MEN'S DWELLINGS IN LIVERPOOL.

That the character and habits of a people are largely influenced by the condition and arrangement of their homes, is an axiom of social and political economy. From this self-evident proposition it follows, that no social reform, whether it assume the aspect of extended education or of sanitary precaution, can be thoroughly effectual if it leave untouched the squalid homes of our labouring classes. We frequently talk of the filth, laziness and drunkenness, of large sections of the poor, and of the improvidence, indigence, sickness and crime, which invariably follow in their wake, as if they were mere results of gross ignorance or vicious propensity, for which the offenders alone were personally responsible. We regard men, however humble in station, as morally free agents, knowing good from evil, and capable of checking or controlling bad habits by a resolute exercise of will; and it is perhaps because of a too confident reliance on so abstract a mode of judging of men's actions, that philanthropy has hitherto but rarely given a truly practical help in the right direction. It has not gone

deep enough in the investigation of remote and predisposing causes. It has not always recognized the fact, that the charity which is distinct from the mere pauperizing gift—that charity which is meant to help the poor to help themselves—must, if it is to do practical and permanent good, begin with the home condition of the recipient.

The overcrowding of a labourer's home is a common occurrence in our large cities. It is not exceptional, or due simply to the bad management of the particular family. It is too frequently a matter of necessity, and cannot be avoided where, as is the case with tens of thousands of the labourers and artizans of Liverpool, the whole family have only one room for habitation and for the offices of life, by day and by night. When persons of all ages and sexes are thus huddled together in insufficient space, there must be at once a lack of the vital air which is necessary for health, and a lack of the privacy which is necessary for decency and cleanliness. The picture will too easily admit of sensational colouring; for we have only to conceive the presence of chronic or loathsome disease, of contagious sickness and of death, in such a room, in order to pile up its demoralizing horrors. But who can wonder at the existence of "filth," where personal cleanliness, as we understand it, is impossible; or of "drunkenness," where the nervous system is perpetually weakened by impure air; or of "laziness," where energy is wearied out by the absence of health-restoring repose? It must be admitted that the candid moralist, in estimating the

character of the poor, ought to recognize the difference between "free agency" with and without overpowering temptation, and to allow that the wretched drunkard may be really the weak victim of his physical condition rather than the willing slave of his immoral propensities. And it should be clearly understood by the philanthropist, the educator and the sanitarian, that their work, to be practically useful, must begin in the homes of the labouring classes.

The Health Committee of Liverpool, acting under the provisions of the 35th section of the Sanitary Act of 1866, have instituted a partial investigation of the number of what are termed "sub-let" houses, i.e. of houses occupied by families in single apartments. They have already registered and placed under official surveillance 8600 of such houses, and at a moderate computation it may be assumed that there remain 17,000 more which would rightly come under the designation of "sub-let." Thus a third of the population of the second commercial city of the empire are living in houses, the arrangements of which are a menace to morality, to order and to health. Even granting that official surveillance can check the most dangerous excesses of overcrowding, it may be asked whether, in the 19th century, such a condition is either creditable to our civilization or without danger to the community? But official surveillance can really do but very little to mitigate the evil. The local authority acts in this matter under the provisions of a penal statute, and it is therefore necessary that the amount of cubical space

(without reference to the moral aspect of the question) required in the rooms of registered sub-let houses should be the very smallest compatible with the health of the inhabitants. And the law demands that 300 or 350 feet of cubical space (according to the precise mode of occupation) shall be allowed for every adult, or for every two children between the ages of six and fifteen, living in such room of a sub-let house.

This leaves unredressed and almost unmitigated a great moral evil—nay more, a great municipal and national disgrace; for while, physiologically speaking, 350 cubical feet, in a room occupied day and night, is a dangerously small space for the maintenance of a healthy man in health, nothing is provided for sickness, and nothing in respect of the decent separation of sex and age. The only satisfactory aspect of official surveillance is, that it has lessened the excesses of what has been termed "vicious" overcrowding, i. e. the overcrowding of a room by members of more than one family; and also that it has been received by the poor themselves as a precautionary measure, designed to promote their health and welfare. It has now been carried on in Liverpool for nearly five years. During many months of that period there has existed among the very poor much agitation in connection with Fenian designs; and though at such times all surveillance is regarded with jealousy, there has never been the slightest complaint against the regulations as to sub-letting. The Inspectors are required, under the written orders of the Medical Officer, to visit suspected

houses at all hours of the night; but they have never encountered insolence or resistance. The only precaution taken by the officers is to be civil in speech, and never to answer a drunkard in his folly. This result is worth recording; for it shews that when the poor recognize that an effort made to remove a home evil is for their own good, they are not far from the capacity of self-help, if only the means of working it out could be placed within their reach.

Why, it may be asked, have the working men of Liverpool fallen into this fatal custom of living in single rooms? Are not the number of houses in the borough sufficient for the population? This will be best answered by the following facts. There were at the census of 1861, 65,781 inhabited houses for the accommodation of 443,938 persons, being on an average one house for every 6·7 persons. As compared with other towns, the population per house was therefore large; for the census placed this figure for Bristol at 6·5, for Manchester at 5·5, for Birmingham at 5, and at Leeds at 4·6. This statement must not be confounded with that of the proportion of population to superficial area, which is much larger in Liverpool than in any other town of the kingdom; and also takes no account of the size of houses, which are smaller in Liverpool than in Bristol. Before drawing conclusions from statistics of population, it is necessary always to bear in mind the considerations last mentioned. Thus, of the districts enumerated in the following table, those of Vauxhall and Scotland Ward are really the most overcrowded,

because the greatest number of their houses are three-roomed cottages; while in those of St. George, St. Thomas, Mount Pleasant, Everton, Kirkdale, West Derby and North Toxteth, are many with six and eight rooms.

	Districts.														
	Scotland.	Vauxhall.	Dale Street.	Islington.	St. George.	St. Thomas.	Mount Pleasant.	Everton.	Kirkdale.	West Derby.	The Toxteths.	Parish.	Out-Townships.	Borough.
Population per house	7·34	7·69	7·32	6·57	8·28	8·03	6·87	5·90	6·34	5·72	6·33	7·28	6·06	6·74

The number of houses built within the borough since the census of 1861 is 15,223, while a very moderate estimate places the number of those pulled down during the same period for railway, commercial and improvement purposes, at 1500. The present calculation of population per house is 6·5.

But if it be alleged that an average of 6·7 or 6·5 persons to each house need not necessitate overcrowding, yet as the fact and its existence remain indisputable, the further questions suggest themselves: Is overcrowding due to mal-arrangement of families, or is it occasioned by the insufficiency of labourers' dwellings, i.e. of separate dwellings at a rental within the means of persons in receipt of daily and weekly wages?

A labourer who earns from 15*s.* to 25*s.* per week may be presumed able to pay from 3*s.* 6*d.* to 4*s.* 6*d.* per week for his house. This is the usual rental of court houses and of the three-roomed cottages in the streets

connected with courts, as well as of many of the separate tenements containing two rooms in what are termed the flat or Scotch-terraced houses. The rental of houses in the more modern streets, and in streets not containing many courts, varies from 5*s.* 6*d.* to 7*s.* per week (£14 to £18 per annum). All houses above this rental are beyond the reach of the families of labourers and working tradesmen, except for room-occupation.

The following table shews that the erection of houses under a rental of £12 per annum, and therefore specially designed for the families of our labouring classes, has largely and progressively diminished during the last three decades.

Years.	Houses at Rentals				Total.
	Below £12.	£12 to £25.	£25 to £35.	£35 & upwards.	
1841 to 50 inclusive	5018	9832	1827	881	17558
1851 to 60 ,, ...	956	10111	1372	889	13328
1861 to 70 ,, ...	499	12180	1656	888	15223
Total	6473	32123	4855	2658	46109

During the years 1865-6-7, there were absolutely no houses at a rental of £12 and under, erected within the borough; but during 1868-9 and 1870, the number of such new tenements amounted to 198. Of these, 110 are included in the block of labourers' dwellings belonging to the Corporation in Sylvester Street, and the remainder are situated in the out-townships of Everton, Kirkdale and West Derby. Indeed, the present condition of the houses in most of the older courts and their neighbouring streets is generally

of such squalid misery, and the owners' receipts for rental so small and uncertain, that even if the price of land were now such as to render it possible to build £12 houses in the central districts of the town, there would be little encouragement for the speculation. But the price of land forbids the attempt; and it must be by the erection of blocks of many-storied houses, such as those in Sylvester Street, or, still better, by the erection in the suburbs of cottages near the lines of railway or omnibus communication (as suggested by Mr. Robertson Gladstone), that any plan of securing separate dwellings for the families of our labouring classes can be realized.

Reference has been made to the *present* condition of court-houses and of the adjacent streets, because such condition is an accident not necessarily inseparable from the plan of their construction. There are indeed very numerous courts which were formed out of the back-yards of front houses, and many more which were built with no other object than that of utilizing land for gain, without any regard for the health and convenience of the inhabitants. No care could have prevented such places from becoming dangerous nuisances; and therefore both the motives and the plans of the builders merit the gravest reprobation. But our condemnation must not be indiscriminate; for many courts which experience has proved to be prejudicial to health were originally built both from excellent motives and with an enlightened appreciation of the wants of the labourer. The first problem

—one still unsolved—was how to build a decent and healthy house in a city near the marts of labour at a rental under £12 per annum. The scheme was to include a three-roomed house with a cellar; the lower room to be the day apartment of the family, where, if necessary, the boys might be accommodated with a pallet or turned-up bed at night; the middle room for the parents, and an upper room for the girls; while the cellar was reserved for washing, storage of coals, &c. To economize space, these cottages were built back to back, and the several spaces in their front united into one flagged area or court. The dimensions of the several apartments were kept at the lowest scale compatible with the health of two adults in a bed-room and of a moderately-sized family in the day-room. So far, the working out of the problem was not only plausible in design, but successful in effect. The first error was the use of a common latrine or cesspit for all the houses of a court and for several houses of the adjoining street; the second was the erection of such a nuisance in the court itself. At first, the latrine was at the closed end of the court; but even this evil was very soon aggravated by another arrangement. It struck some reformers that it would conduce to decency if this convenience were placed in the passage or entrance, so as to secure the possibility of its being visited without observation. A sentimental idea was thus the cause of an intolerable sanitary evil; for not only were the entrances to the courts narrowed and blocked up, but whatever air

circulated within them was effectually polluted with offensive miasm. The conversion of privies and cesspits into trough water-closets, and the re-opening of the entrances of courts, have done much good in the way of structural improvement; and now, as far as the plan and position of these houses, apart from their condition, are concerned, there is no reason why they should not be healthy dwellings for the labouring classes. But the crying evil at the present moment is the condition of the houses, and this altogether depends on the nature of the tenancy and occupation. At first, court-houses paid well, and were occupied by decent and orderly tenants. After a time, property was divided, the houses sold to various purchasers, and the regulation of many of them transferred to agents whose single object was the collection of weekly rent. Then began sub-letting and room-occupation. No questions were asked, and no objections made, so long as the chief tenant paid his 3*s.* 6*d.* or 4*s.* 6*d.* a week. The middle room was easily let for 2*s.*, the upper room for 1*s.* 3*d.* per week; so that the chief tenant of a 3*s.* 6*d.* house, who contented himself with the bottom room, sat at a rental of 3*d.* per week. In the case of a 4*s.* 6*d.* house, the upper room and the cellar together let for 1*s.* 6*d.*; the middle room again for 2*s.*; so that the chief tenant sat at a rental of 1*s.* per week. But, again, some chief tenants, and some even of the sub-tenants, managed to live altogether rent free, and possibly to make money, by receiving lodgers into their one family-room. Thus, gradually, but too easily

and quickly, were the cottage houses, built solely for the use of one family, occupied, without any regard for decency and health, by the members of three or even more. In 1846-7, the wave of Irish pauperism overwhelmed the town. Of the 300,000 immigrants who landed on the shores of the Mersey between January and June, 1847, it was estimated that from 60,000 to 80,000 settled themselves permanently in Liverpool, occupying every nook and corner of the already overcrowded lodging and sub-let houses, and even forcing themselves into the cellars (about 3000 in number) which had been closed to habitation under the provisions of the Health Act of 1842. If the first or originating causes of the present high death-rate of the town were to be traced, they would be found in this immigration of 1846-7, and in the facilities afforded for its permanent settlement by cellars and single-room habitations. These facilities arrested and made chronic an evil which otherwise, after some temporary strain on the poor-rates, would in all probability have passed away. As it was, so far as the labouring classes were concerned, it dislocated and disorganized the whole social fabric. Houses built for the decent accommodation of families ceased to fulfil their purpose, and became in large districts the centres of disease and immorality; while from these centres not only contagious sickness, but also contagious idleness, pauperism and drunkenness, extended their ravages and found their victims.

The above facts answer the question as to the insuf-

ficiency of labourers' dwellings within the borough. But they also shew that that insufficiency has been materially aggravated by mismanagement so bad as to injure both tenants and landlords.

Has the canker pierced so deeply as to render the evil irremediable? Is the herding together of families in single rooms, with all its unavoidable indecencies, all its menaces to health, all its temptations to immorality and crime, to be a permanent institution and an unavoidable necessity for our labourers? Political economy will answer, Yes, unless it can be shewn that workmen's dwellings can be made to pay; for the housing of large sections of the community is a financial matter far beyond the reach of mere benevolence. Rich philanthropists, like Miss Burdett Coutts and Mr. Peabody, may attack the evil; but the attack will never be successful on a large scale, unless commerce lends its aid; and that will never be until it is clearly understood that the enterprize offers a fair interest upon invested capital.

It becomes, therefore, one of the most important problems of social science to ascertain the practicability of providing and maintaining as a remunerative investment of capital, cheap, decent and healthy dwellings for the working classes. This has been practically, and to some extent successfully, solved in London by a Society incorporated by Royal Charter, and termed the "Labourers' Friend Society." The annual reports of this Society give the financial results of their various undertakings, and the cost, expenses

and rents of their several establishments. It is unnecessary to recapitulate all the minutiæ of the accounts; suffice it to say, that though one establishment (a washhouse, costing originally £3140) is purely benevolent and yields no return, the total undertakings of the Society for the last eight years shew an average profit equal to £4. 1*s.* 4*d.* per cent. per annum. The most remunerative, and also the most useful, of their undertakings have been those in which the Society have purchased and renovated dilapidated dwellings, and by structural alterations and repairs converted them into suitable dwellings for the labourer, either as residences or model lodging-houses. Thus we find that the establishment in Charles Street gave an average profit of £12. 16*s.* per cent.; that in Hatton Garden, £4. 3*s.* 8*d.* per cent.; that in Clark's Buildings, £7. 10*s.* 7*d.* per cent.; that in Tyndall's Buildings, £5. 9*s.* 4*d.* per cent.; and the houses in Wild Court, £4. 3*s.* 8*d.* per cent.

There is no necessity to go to London to demonstrate the financial success of labourers' dwellings when built in a block; for the report of the Treasurer of the town of Liverpool shews that the net yearly profit of the Corporation Buildings in Sylvester Street has already been $5\frac{1}{2}$ per cent., and will be $6\frac{1}{2}$ per cent. when the basement apartments are let.

A similar experiment, of which we are permitted to give the results, has been tried by a private association of benevolent persons. About fifteen years ago, blocks of labourers' dwellings, containing 23 houses, were built in Upper Frederick Street at a cost of £4200.

They are let at rents varying from 6*s.* to 4*s.* 3*d.* per week. They are under a supervision which is partly economical, but also partly moral. The result is that they are always full; that there have been very few arrears of rent; that the tenants are free from epidemic disease; and that the return for the outlay has been 4½ per cent.

There are three directions in which a Society established in Liverpool for improving the condition of the labouring classes might work with advantage, not only to the amelioration of the home arrangements of the people, but also to the general health, welfare and morality of the town.

1st. By the erection of blocks of model houses for families, similiar in conception, though not in every detail of plan, to those lately built by the Corporation in Sylvester Street. Such blocks of combined dwellings necessarily require, in the first instance, a large expenditure of capital, and therefore seem at the outset to be more expensive than separate buildings; but the experience of large towns shews that, where land is very dear, the principle of their construction is the cheapest, and therefore most profitable and best for owners and occupiers. It presents many facilities for the economical maintenance and management of property, and secures for tenants many sanitary advantages which, at the same rent, would be otherwise unattainable. It enables architects to erect the largest number of remunerative tenements on a defined area without any breach of the building regulations of the

town, and without any prejudice to the health of the inhabitants. This is indeed its chief advantage: without it, it will be utterly impossible to provide in the future for that teeming and ever-increasing population which crowds around the marts of industry and commerce. This pressing forward of masses into certain districts of a town must not be overlooked in considering the comparative desirableness of separate or combined dwellings. Artizans, mechanics and labourers, will, if possible, live near the points of their daily occupation, and to do so will submit to home inconveniences which in time both degrade the men themselves, and preclude the possibility of physical or moral improvement in their children. The thinker who in his study estimates the impulses and actions of men by the laws of pure reason, finds no difficulty in shewing the folly of such erroneous conduct. He easily proves that the distance from its place of occupation at which a family resides, is not to be put in the scale against the squalidness and filth which are the inseparable accompaniments of overcrowding. Then with him the problem is solved. The people should move from centres to circumferences, and find their homes in suburban and outlying districts. This is all very well in theory; but the practical philanthropist has to do with things as they are, not with things as they should be. And as no cogency of reasoning will convince men of error as long as they live in a state of moral and physical degradation, we must endeavour

(pending the effects of extended and compulsory education) to meet the present exigencies of the case.

The great difference in towns in respect of overcrowding, which we have shewn to exist, is largely dependent on the kind of work in demand, and on the position of the centres of industry. A town whose chief work is performed by unskilled labour will necessarily attract more hands than one where only the skill of a well-drilled apprentice can find remunerative employment. Hence it is that Liverpool, whose labourers are chiefly occupied in mere manual work in connection with docks and warehouses, is always overcrowded in excess of the demand with what, to use a now familiar phrase, may be termed the residuum of industry; while Manchester, Sheffield and Birmingham, require and can encourage only artizans and mechanics possessing trained and special skill. The position of the points of industry is even more influential on overcrowding than the nature of the work itself. Thus, in Liverpool, the chief, and indeed the only, marts of commerce are the lines of docks and warehouses on the bank of the river, which, in reference to the topography of the town, may be described as the chord of an arc, which stretches through Bootle, Kirkdale, Everton, Kensington, Edge-Hill and Toxteth; while in Birmingham the centres of labour are as numerous and as distinct as are the special factories around which conveniently congregate the workers of the hive. This occasions a marked distinction between

the homes of the operatives in the two towns; and that distinction exists apart from the inequality of the wages earned by skilled and unskilled labour. In Liverpool, the labourers keep as close as possible to the Mersey, and to do so huddle together with their families in single sub-let apartments; while the mechanics of Birmingham choose their residences in more open spots, and maintain their homes with more decency and cleanliness. The necessity of adopting the principle of combined dwellings is greater in the commercial than in the manufacturing town, in Liverpool than in Birmingham. It would be doubly advantageous if, in carrying it into practical effect, the block of buildings could be made to take the place of some of the filthy nests of narrow streets and noisome courts which are now in Liverpool the homes of drunkenness and the centres of infectious disease. Such buildings, with their court-yards and adjoining broad thoroughfares, upon which both the light of the sun and the light of publicity could fall, would be the beginning, not only of a moral, but of an architectural reform, of which Liverpool stands greatly in need. But,

2nd. Such a change as this can only be effected very slowly and gradually. In the meantime, what is to be done with the great mass of cottage property which, not because of its situation or original structure, but of its present condition, is altogether unfit for human habitation? The owners can do little, and will do less. Many of them, persons of straitened means, stand in a perpetual difficulty between the

pecuniary and sanitary demands of the Corporation and the poverty and brutality of their tenants. They have to combat with a condition of things beyond their control—with tenants who, themselves in arrear, sub-let rooms at rack-rent prices; and who, if their profitable roguery be interfered with, are ready in revenge to injure the property by burning the doors and breaking the windows. Without direct and personal supervision, it is impossible either to get a profit from houses so tenanted, or to maintain them in sanitary repair. Few owners can afford the time to give this personal attention to their property, while agents, as a professional class, are little more than collectors, whose chief object it is to extract the maximum of rent at the minimum of outlay, and who, to secure this end, practically abandon all moral supervision of the tenants. The consequences have been lamentably bad. There are whole courts and streets in which vice and disorder reign supreme, and in many houses of which the tenants are mere squatters, who acknowledge no landlord and pay no rent. Such places, it is unnecessary to say, are the nurseries of pauperism, disease and crime. If the statistician could estimate the mere money cost, direct and indirect, of such a state of things to the community at large, it would startle many of those who, moved by no benevolent impulse, are now selfishly content to let things remain as they are. The question, therefore, is one in which all ratepayers and all capitalists have a direct pecuniary interest. Nor can the evil be remedied by the surveillance of the police, or by the slower but surer agency of the schoolmaster. No improvement will or can originate with the present owners of cottage property; and it is here, therefore, that the example of the Labourers' Friend Society of London is especially instructive and encouraging. Wild Court, Drury Lane, as graphically described by Lord Shaftesbury, was before its renovation a squalid den of infamy and filth, comparable at least with the worst districts of Liverpool. The Society, having purchased it for a fair but moderate price, effected a few structural alterations, and placed the houses in good, serviceable repair. As the block contained 106 rooms, the Society was able to arrange for a resident superintendent, whose duty it was to maintain a constant supervision of the property. He lets the houses, collects the weekly rents, and keeps a book in which the names of the tenants and the number of their families are duly recorded: he permits no sub-letting: habitual dirt is prevented: no drunkenness or disorderly conduct can be practised unchecked: the place is not suffered to become the haunt of thieves and prostitutes. The result has been supremely excellent. This place, into which no prudent man would have ventured to go by himself even in the day-time, is now by day and night a pattern of order and cleanliness, and may be visited by ladies with safety and satisfaction in their missions of charity. The success of the enterprize commercially has not been inferior to its success as a moral renovation. Its average profit return during the last eight

years has been £4. 15*s.* 6*d.* per cent. on expended capital. But the condition of Wild Court in itself only illustrates a part of the good effected by the Society in this transaction; for the locality which once intensified the poison of social and moral evil, and helped to spread abroad the contagion of vice, now, by the light of its example, aids to disperse the moral darkness of the neighbourhood.

Many other examples might be given of the working of this and kindred Societies; but our chief object is to shew that as is the need so also is the scope for the formation of a similar Association greater in Liverpool than in London. It would not be difficult to purchase large areas of streets and courts on freehold land at a price which, under good and systematic management, would be remunerative. The houses having been renovated, placed under the control of a resident manager, with strict covenants against sub-letting, and under regulations similar to those of the London Society, would soon be welcomed as separate homes by decent and orderly labourers. All the good results which in London have been found to follow in the train of the example of Wild Court and other renovated and well-managed blocks of houses, would at once be obtained in Liverpool. The charity which here, in many shapes, has laboured so assiduously to mitigate the unavoidable distresses of our fellow-creatures, would find in such well-ordered districts a pleasant field of usefulness. Merchants and brokers, who are the large employers of labour, might here re-establish between

themselves and their men that intercourse which all must desire to exist between the families of masters and servants. In Liverpool, almost alone amongst the provincial cities of the kingdom, the intercourse between masters and men, between employers and employed, ceases on the payment of wages. This is a desolate condition of honest, striving industry, and bodes no good to the social system.

There is another phase of usefulness which should not be lost sight of in the working of a Labourers' Friend Society, and that is the establishment of lodging-houses for single women. The profits of model lodging-houses for men are sufficient to encourage the enterprize of individual speculators; but nothing, or next to nothing, has been done to secure a decent home at a moderate price for single women who follow industrial pursuits, or for female servants out of place.

The example of a system of well-managed blocks of houses would do good to the neighbourhood in which they were placed, and would in time elevate the social condition of the tenants of houses in large districts around. It would encourage the owners of other cottages to assume and maintain the rights and responsibilities of property, and to check disorder, sub-letting and overcrowding. It might probably induce many landlords to join the Society, and to exchange the trouble and difficulty of collecting rents for the guarantee of a safe and regular interest on their capital.

Two things are required to ensure the success of renovated dwellings as a commercial speculation: first,

they must be sufficiently numerous and sufficiently near to each other to admit of control by a resident superintendent, who would be answerable for the condition of the property; and next, the houses or tenements must be so altered in plan as to accommodate families according to their size, in one, two or three apartments.

3rd. The Society might also erect suburban cottages in situations where land is cheaper than in the heart of the town, but whence labourers might be conveyed to their work by trains specially adapted to them in time and fare. There, too, a resident manager would be required, and the same regulations ought to be enforced as in the two preceding cases.

There is every reason to suppose that these objects might be attained by an Association worked, not on philanthropic, but on commercial principles, and that an adequate return would be made on capital thus expended. It remains to be seen whether the plans proposed in this pamphlet at all commend themselves to the minds of those who are anxious to remove the reproach, both physical and moral, which justly rests upon the town of Liverpool in its relation to its labouring classes.

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REPORT

ON

THE SANITARY CONDITION

OF

BIRKENHEAD,

For the Year 1870.

BY

C. O. BAYLIS, M.D., M.R.C.S., &c.,

Medical Officer of Health for Birkenhead.

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1871.

HEALTH COMMITTEE

OF THE

BIRKENHEAD COMMISSIONERS

FOR 1870-71.

BRAITHWAITE POOLE, JUN., ESQ., CHAIRMAN.

MR. JOSEPH BRATTAN.

„ FREDERICK FORREST.

„ GEORGE HARRISON.

„ WILLIAM WALKER.

„ JOHN R. WILLIAMS.

THE SANITARY STATE

OF

BIRKENHEAD AND CLAUGHTON,

DURING 1870.

Report of the Medical Officer of Health to the Health Committee.

The present Annual Report has been somewhat deferred, in order to make use of the element of accuracy just furnished by the census of April, 1871. The possession of this important, but too infrequent test, will also explain the special attention given to the vital statistics made up since the previous census of 1861, as well as justify the investigation entered into with respect to the remarkable flow and ebb of the local population. The latter subject will be first discussed.

NECESSITY OF A MORE FREQUENT CENSUS.

There can be no doubt that the more vigorous evolution of the various problems of political, economic, and social life springing out of the vastly increased national development demand a more frequent general census than the present decennial one. Especially is this the case in sanitary questions, which require for their solution a true death rate, which can only be arrived at by a tolerably certain knowledge of the annual population; this latter is, at present, provisionally estimated in the office of the Registrar-General, by assuming a rate of increase (or otherwise), proportionate to that averaged between the two previous censuses, until the succeeding one furnishes the proper means of correction. These provisional estimates, however, become increasingly unreliable after the first few years of the decade, and the resulting death rate then becomes less and less to be depended on.

A Quinquennial Census Indicated.

Another defect attaches to the present infrequent system, because it entirely fails to register any conjoined rise and fall of the population, if either continue for a less time than the decennial period, for instance, from local sources of information it is demonstrable that the population of Birkenhead (and Claughton) rose from the census number of 37,796 in 1861 to 54,000 in 1866, and, from that time to the census of the present year, it decreased to 45,034; yet there is not the slightest indication of this important aberration in the present decennial return, though a quinquennial one would have assuredly registered it, and furnished other more reliable data for resolving the various sanitary questions.

Mode of Estimating the Local Annual Population.

Since the appointment of a Medical Officer of Health for Birkenhead, in 1864, the annual variations of population have been carefully investigated, and these variations are recorded in the annual sanitary reports. Starting from the general census, they are then based on the difference in number of the houses found occupied at the middle period of each year, multiplied by the census rate per house, and the result successively added (or otherwise) to the previous annual computation. This method is accurate enough during a progression equal to that in which the general census was taken, but fails when retrogression of population sets in, because the tension of crowding, caused by high rents and deficient accommodation, then gives way, and a lower rate per house than the census rate becomes the actual one; it is quite possible, however, by a re-census of known and representative streets, to obtain the ratio of its diminution, and then make the necessary correction.

Record of the Annual Population.

The annual estimates, thus computed and registered, are again recorded in the following table, together with the corresponding number of deaths for each year, the number of occupied and unoccupied dwellings, and the average rate per dwelling, nearly all of which so far agree proportionately as to afford the strongest confirmation of the correctness of the population estimates previously arrived at.

Decennial Table of the Local Population, &c.

Year.	Population.	Dwellings inhabited.	Rate per Dwelling.	Total Deaths.	Non-Zymotic Deaths.	Dwellings unink'bd.
1861	37,796	4885	7.7	751		353
1862				920	(1)	
1863				1103		
1864 (2)	51,396	6615		1254	791	531
1865	53,000	6960		1133	835	349
1866	54,000	6988	7.7	1217	824	452
1867	52,826	6837		1101	786	689
1868	51,000 (3)	6763	7.5	1074	716	815
1869	47,000	6740	6.9	929	643	866
1870 (4)	45,000	6754	6.6	855	691	875
1871	April Third. 45,034		6.6			895 (5)

Rise and Temporary Fall of Population Accounted for.

The rise of the population to its highest point, in 1866, and the lesser fall to its lowest point, in 1870, are due to a remarkable coincidence of depressing commercial and local causes. Intimately bound up with Liverpool, Birkenhead participated, to the end of 1866, in the results of a general commercial prosperity, sound enough in itself, but exceptionally stimulated and exaggerated by the profuse employment, and ultimate waste of the capital drawn out by the numerous limited liability companies, then first starting into existence. The inevitable collapse occurred in 1866 and 1867, and confidence is even now only being fully restored. But the

(1) This series of deaths is given, because, by getting rid of the uncertain zymotic element they more nearly follow the variations of population.

(2) The mortality for this year was exceptionally great, owing to the extreme prevalence of small-pox and other zymotic diseases, which alone carried off no less than 460 persons.

(3) This number, 51,000, was not arrived at when the report for the year was drawn up, but was given as revised in a note at page 7 in the report of the following year. The overcrowding which existed up to and during 1866 declined rapidly from 1868 to 1870, but its first decline was not immediately recognised.

(4) All signs of overcrowding disappeared this year.

(5) Besides some new houses included in this return, there are barrack dwellings in Jackson-street, Brougham-street, &c., counted by their dwellings, which are only counted as individual buildings in the other or township returns in the column above it.

local causes were still more serious, for the continued expenditure of so many millions sterling on the great dock works came to an end in 1869, and the numbers of workmen employed on them fell off from 1,750 (1) in the middle of 1867 to 330 in 1869, the latter being soon afterwards entirely discharged. These workmen, which represented, with their wives and families, in 1867, a population of 7,000 within the town and neighbourhood, had all ultimately to migrate elsewhere, leaving not only a gap in the general population, but heavy losses and derangements in the business affairs of the town. The zero was reached in the middle of 1870, when the population was reduced to 45,000, or a trifle less than the census number of April, 1871.

Deaths and Births During 1870.

The total number of deaths registered was 855, of which 434 were those of males, and 421 of females. The births registered amounted to 1792, which included 889 males and 903 females.

The Death and Birth Rate.

The certain knowledge of the population number afforded by the proximity, as to time, of the census, gives to the death and birth rates of 1870 an indisputable accuracy. The population in the middle of the year being 45,000, and the number of deaths 855, the resulting death rate is exactly 19 per 1,000 per annum. The birth rate, also, is equally propitious, amounting, as it does, to 39·82, or very nearly 40 for every 1,000 of the inhabitants.

Registrar-General's Death Rate of the Parliamentary Borough.

In his Annual Summary for the year 1870, just pulished, the Registrar-General, though not aided as he ought to be, by, at least, a quinquennial, if not an annual census, computes the death rate for the Birkenhead Parliamentary district, including Tranmere, Oxton, &c., to be as low as 17 per 1000, and places this Borough

(1) The number of workmen had previously reached 3000.

at the head of all the 67 chief towns in England, in respect of lowness of the death ratio (1).

An Inter Anglican Comparison for 1870.

	Name of Area.	Death Rate.		Birth Rate.
(2)	All England, per 1000.....	23.34	...	35.86
(2)	Town Districts	24.75	...	
(2)	Country Districts.....	21.47	...	
(3)	Birkenhead.....	19. 00	...	39.82

Analysis of the Mortality during 1870, in Birkenhead, Compared with that Averaged from the 17 Principal Towns of England.

Locality.	Total Annual Death Rate per 1000	Rth Rt. from the 7 chief Zymotics per 1000.	Percentage of Deaths under 1 year to Births.	Per'ntge of deaths to total deaths			
				Under 1 year of Age.	Above 60 years of Age.	From the 7 chief Zym'tics.	From violence
Birkenhead (3)	19.0	3.6	14.2	29.8	12.4	14.2	5.3
17 Chief Towns (4)	25.0	5.5	18.3	26.4	18.7	22.1	3.2

Mortality of the Four Quarters.

In the first, or winter, quarter were registered 218 deaths. In the spring quarter 162 ; and in the summer and autumn quarters 211 and 264 deaths respectively. Of these 44, 29, 48, and 43, in the 1st, 2nd, 3rd, and 4th quarters respectively, were due to zymotic diseases. The corresponding rates per 1000 per annum, with the corresponding ones averaged of the previous six years, are given below.

(Note 1.) The same Report, viz., Registrar-General's Annual Summary of 1870 also gives Liverpool as being one of the towns having the highest rate of mortality, so that we have two Boroughs only separated by a river (here within a mile in width) which give the highest and lowest death rates in all England.

(Note 2.) Registrar General's Fourth Quarterly Report for 1870. The rates are based on estimated populations, but are safe for being near approximations.

(Note 3.) On population confirmed by the recent Census.

(Note 4.) Registrar-General's Annual Summary, 1870.

TABLE.

DEATHS.	ANNUAL RATE PER 1000, PER ANNUM.				
	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year.
All Causes—1870	19·3	14·4	18·7	23·4	19·0
Average of previous 6 years	23·2	18·9	20·8	23·9	21·6
Zymotic Causes—1870....	3·9	2·5	4·2	3·8	3·6
Average of 6 previous years	6·6	5·3	7·7	7·5	6·8

Table, giving the Deaths of 1870 and the six preceding years, in Classes arranged in Five Groups.

DEATH CAUSES IN CLASSES AND GROUPS.	Years.						
	1864	1865	1866	1867	1868	1869	1870
1. Zymotic Group	463	298	393	315	358	286	164
2. Constitutional Diseases:							
Gout, Cancer, &c.....	38	38	29	35	24	23	32
Scrofula, Phthisis, &c.	135	174	161	146	137	119	143
3. Local Diseases:							
Brain, &c.	107	117	93	120	117	104	105
Heart, &c.	24	34	36	34	26	40	36
Lungs, &c.	172	160	199	183	159	120	142
Stomach, &c.	46	43	42	30	23	37	38
Kidneys, &c.....	7	18	14	11	11	10	12
Uterus, &c.	2	4	3	1	2	0	0
Bones, &c.	6	4	1	2	1	4	5
Skin, &c.	7	1	3	8	6	5	7
4. Developmental Diseases, &c.:							
Premature Birth, Atrophy, and Debility*...	128	124	139	129	119	85	74
Childbirth.....	6	6	4	4	7	8	3
Old Age	37	34	38	25	25	35	35
5. Violent Deaths	61	51	46	42	49	37	46
Causes not specified.....	15	27	21	16	10	16	13
Totals	1254	1133	1217	1101	1074	929	855

NOTE.—* Atrophy and Debility are included, to obviate the effect of some changes in the compilation.

RESPONSIBILITY OF THE COMMUNITY FOR ZYMOTIC DEATHS.

The names sufficiently explain the classes and groups of the previous table. Now, it is well known that while sanitary measures affect, favourably, the mortality in every group, they alone decisively control, diminish, and might even extirpate the maladies of the first or Zymotic group. People may die in a sort of semi-natural course, from constitutional, local, or developmental disease; or they may be killed off by violence; but for every Zymotic death the community itself is more or less responsible—for the community alone, and not the individual, can adopt the requisite safe-guards. The following is a seven years' analysis of the Zymotic group.

Table, shewing the absolute numbers of the various Zymotic Deaths in Birkenhead for Seven Years.

	1864	1865	1866	1867	1868	1869	1870
Small Pox	123	37	1	...	...	...	2
Measles	78	21	36	23	26	72	1
Scarlatina.....	81	21	95	113	127	63	28
Diphtheria	6	7	11	11	8	4	5
Whooping Cough.....	11	28	49	29	65	9	21
Fever	74	63	48	44	20	37	21
Diarrhœa	61	76	56	60	80	54	44
Total of Seven chief Zymotics	434	253	296	280	326	239	122
The other Zymotics, viz.:—							
Cholera	...	3	61	...	2	1	...
Croup	15	14	17	19	13	32	23
Dysentery.....	1	5	2	3	2	2	2
Cynanche & Aphtha	2	5	...	7	4	4	6
Erysipelas & Pyæmia ...	4	8	3	...	5	3	5
Metria	3	...	4	...	...	1	1
Syphilis	3	6	8	3	4	2	4
Puerpura		...	...	1	2	1	1
Intemperance	1	4	2	2	...	1	...
Totals.....	463	298	393	317	358	286	164

To obtain, however, a true comparative view of the checked or unchecked ravages of the most important—*i.e.* the Zymotic enemy—

it is necessary, in consequence of the difference o population in the different years, to correct the number of deaths for each year to correspond with the population of 1870.

Table of the Seven Chief and other Zymotic Diseases, &c., for Seven years, corrected to the population of 1870.

	1864.	1865.	1866	1867.	1868	1869.	Average of six preceding Years.	1870.
Small Pox	107·7	31·5	0·9				23·3	2
Measles	68·3	17·9	30·	19·6	23·0	69·	37·9	1
Scarlatina.....	71·	17·9	79·2	96·3	112·2	60·4	72.8	28
Diphtheria	5·3	6·	9·2	9·4	7·1	3·9	6·8	5
Whooping Cough	16·	23·8	40·9	24·7	57·4	8·7	27·5	21
Fever.....	64·8	53·5	40·	37·5	17·7	35·5	41·5	21
Diarrhœa	53·5	64·6	46·7	51·2	70·6	51.7.	56·3	44
Seven Chief Zymotic Diseases	380·0	214·8	246·9	238·6	287 8	229·2	266·1	122
Cholera.....	..	2·6	50·9		1·8	0·9	9·3	
Croup	13·2	11·8	14·2	16·2	11·5	30·7	16·2	23
Other Zymotics.	12·3	23·8	15·9	13·7	15·	13·4	17·3	19
Total Ditto ..	406·0	253·1	327·8	268·6	315·9	274·2	308·9	164
Total Non-Zymotics	692·5	708·4	786·7	669·6	631·8	615·3	683·0	691
All Causes	1098·5	961·5	1114·5	938·2	947·7	889·5	991·9	855

The Local Mortality at its Lowest Record, in 1870.

The first thing so agreeably apparent in the above table is the remarkably small number of deaths, from all causes, in 1870, as compared with the average of the six preceding years, or with the (proportionate) numbers of any one of them. Thus, the 855 from all causes in 1870 is 136 less than the average of the 6 years, and 34 less than the year of least mortality in the averaged series. If, however, we deduct the 691 non-zymotic deaths, which are 8 *above* the average, then, the diminished mortality is seen to belong entirely to the zymotic deaths of the year, *i.e.*, we have only 164 zymotic deaths of 1870, as contrasted with 308, the average number of the previous 6 years, and 253 in 1865, which had the fewest of such deaths in any one of such averaged years.

This happy diminution, amounting to nearly one-half in the average of the zymotic or preventable group, extends to every single disease included in it, and the result, so far, indicates common influencing causes. Such a great diminution is as unusual as it is satisfactory, and, whether owing to successful efforts, to the cessation of overcrowding, or to the enforced or temporary impotence in this town of a leading zymotic, or, as is probable, that the potential action includes all these causes, it is a most welcome and noticeable fact, and one to be carefully studied with a view to continued and further efforts.

Law of Irregular Cycle in Zymotic Disease.

Zymotic diseases generally may be rendered more or less impotent by isolating or modifying their infection, by improving the habits and conditions of the people, or by the perfect sanitary state of the district, to which may be added, as to any one special zymotic disease, the decay of its potency from exhaustion in the community of the necessary material to feed or act upon. Practically, some one of these zymotics is always found prevailing with undue activity, having its period of increase, culmination, and decline, while the others are comparatively quiescent, only, however, according to circumstances, to take their own lethal turn in an irregular cycle, thus, small-pox having commenced with 34 deaths in 1863, is seen, by the table, to have culminated in the proportionate number of 107 in 1864, and to have declined to 31 in 1865; Cholera dominated in 1866, but, in its 4th quarter, Scarlatina gets above its average, increases to 96 in 1867, culminates to 112 in 1868, and declines to 60 in 1869; Small Pox then appears in 1870, after a second absence of four years, and, taking previous experience as index, it had valid pretentions to become the leading disease. Will it do so? and, if not, what is the probable reason of its impotence?

The Local Small Pox Epidemic. (1)

This worst of all epidemics—Small Pox, was introduced by a

(Note 1.) Full particulars of the early invasion, with remarks and suggestions, by the Medical Officer, were published in the *Lancet*, of December 3rd, 1870.

family on tramp, who brought one of their children home in a convalescent state from Blackburn to Egerton-street, in this town, about the 15th May. Three others of the family were then successively attacked, and the pest quickly infected the vicinity. Its presence only became known to the sanitary authority on June 25th, but by July 15th no fewer than 80 cases, including one death, were discovered and registered. The disease subsequently made its appearance in every part of the town, in all the neighbouring parts of Cheshire, and afterwards, from other sources, reached Liverpool, where it committed very great ravages.

Preventive Measures.

As soon as the presence of the disease was discovered, increased cleansing was instituted, removal of the sick to hospital urged, disinfection of clothes, houses, and localities enforced, as well as all other available means taken to check its progress. An immediate house-to-house inspection having demonstrated that only one-third of the children under four years of age, in Egerton-street and its courts, had been vaccinated, more than fifty or nearly all the unprotected ones were immediately operated on by the Public Vaccinator, together with the unprotected children of two or three other streets of those most likely to receive the infection. The whole of the medical men of the town were also communicated with, among whom the Parish Surgeons especially exerted themselves most effectively in seeking out unprotected children for instant vaccination. Finally, the Parish Authorities stepped in with measures to the same end, so that the immortal teachings of Jenner's great discovery became pretty freely carried out; but it is sad to reflect that while science has, for so long a time, demonstrated the means by which Small Pox may be changed from the worst to the mildest Zymotic Epidemic, and that complete isolation of the patients will stop the disease, that only an imperfect, because not universally enforced, system of Vaccination is secured by the legislature on the one hand, and that no powers to enfore complete isolation of the infectious sick are conferred by it on the other. When the infinitely smaller interests of cattle were endangered by rinderpest, legislative action was wonderfully prompt and vigorous. In the present instance the

extent to which Vaccination has been carried out, together with some favouring circumstances, more than promises, it may be even asserted, will ensure that the present epidemic will be far less fatal than on former occasions; but, had the power of isolating all infected persons been conferred by the law and properly carried out, then the pest might have been soon stamped out and its dire results nearly altogether prevented.

Table of Deaths from two former Small-Pox Epidemics.

First Cases.	Years.	Deaths.		First Cases.	Years.	Deaths.	
45th week	1856	1	75	24th & 31st week	1863	34	195
6th week.	1857	44			1864	123	
	1858	29		.....	1865	37	
	1859	1			1866	1	
	1860	0		.....	1867	0	
	1861	0		.....	1868	0	
	1862	0		.....	1869	0	
				26th & 46th week	1870	2	

The above table shews the very serious results, even in the present day, of a Small Pox Epidemic, occurring, as it would seem to do, about once in six or seven years; the first one of 1857-58 annihilated 75 lives and burdened the community with 12 to 20 times that number of, more or less, alarming cases of illness. Taking the smaller proportion, however, as representing those with an element of danger, or temporary business inability, we arrive at the number of 900 serious illnesses coincident with the 75 deaths. Again, the epidemic of 1863, 1864, and 1865, gave far worse results, for the number of deaths was 195, and the seizures of the disease would considerably exceed 2,000. Who can tell the consequent affliction in the family, or rightly estimate the enormous pecuniary loss, such plagues inflict on the community?

The Remaining Zymotic Diseases.

Continuing the examination of the latter Zymotic table, we further note that the two diseases, Fever and Diarrhœa, which are, perhaps, the steadiest test of sanitary effort, have shewn an almost

continuous decline. The observation to a much more limited, though not unsatisfactory, extent, applies to the Zymotic death totals. It is remarkable that Measles only caused one death during 1870, so that if Birkenhead were an entirely isolated community, the absence of infection, from this disease, would probably ensure its total disappearance. The deaths from Whooping Cough have varied considerably, but both this disease and Croup are additionally influenced by the weather and its action on the ventilation, &c., of the dwellings. The other Zymotic causes of death, though of interest, have yielded too few results to call for further special notice.

Concluding Remarks.

Viewed as a portion of the great populous port of the Mersey, but separated by the broad river from Liverpool, Birkenhead is seen to form the western suburb, and thus lies in the direct track of the western sea breezes, which here prevail over the easterly class of winds in the proportion of 3 to 2. Geologically the lower portions and major part of the town rest on boulder clay, superposed with varying thickness, (1) on the denuded and irregular surface of rock, of the new red sandstone formation, the rock itself crops out in several places, and, speaking generally, constitutes the higher parts. An extensive system of sewers conducts the drainage directly into the river, though part of it remains pent up during the time of high water. All the chief streets are of ample width and run in strait lines through and across the town, the area of which, however, is even yet but moderately covered with buildings, so that the Sanitary Bye-Laws of 1862, if fully enforced, will always prevent it from being much over-crowded with habitations. The water supply is exceedingly good and plentiful. The greater part of the dwellings are quite modern. Well conducted public slaughter houses are provided by the local authority, and many evils ordinarily connected with ancient towns have, in this, but little existence.

(Note 1.) The extreme thickness hitherto known of the clay bed is 140 feet in the case of wells being sunk for the brewery and corn mill in Livingstone Street, and 135 feet at the corn mill in Arthur Street; from this extreme depth it varies in other places to a thickness of a few feet.

Some Structural Defects.

Unfortunately, before the adoption of the Sanitary Bye-laws above referred to, many wretched and improperly constructed courts were created, and narrow streets laid out. Whole rows of dwellings, too, were built with little or no sufficient areas for due ventilation; added to this, the foul midden system was the one at first adopted in common with all the northern towns. These evils have to be met by increased cleansing, general disinfection, the conversion of the privy middens into water-closets and dust-bins, and the demolition, when feasible, of improperly constructed dwellings and court habitations, together with the construction of new roads to open out two or three crowded localities.

Practical Desiderata.

Some change in the present mode of connecting cottage drains with the sewers is much required, such as making sink pipes, &c., terminate over gully openings in the yards outside the building, so as to prevent direct access into dwellings for sewer gases through imperfect tubes and traps. The sewers themselves, also, require to be very much more extensively ventilated than at present. The vacant lands in the town, especially those adjoining courts or crowded neighbourhoods, are often fouled by refuse, and in that respect would be greatly benefited by enclosure. The frequency required for thorough scavenging of streets and places cannot be diminished with impunity to sanitary results, and will need a prompt or a steady increase in proportion as the population recovers itself. Finally, a discouragement of the bad system of constructing low chimneys will tend much to the conservation of a good atmosphere about the town, as will also a strict enforcement of the laws with respect to the illegal production of dense black smoke in the case of all trade furnaces.

Work of the Sanitary Department in 1870.

Disinfection and deodorisation have been steadily practised with respect to gully-hole cleansings, cab-stands, and ashpits during

summer, and to streets and courts, as occasion required. Some 20 pools of stagnant water have been drained off by the Commissioners, and 46 others by notice to the owners. 783 notices to cleanse have been issued, and ultimately complied with, for obstructed drains. House and common Lodging-house inspections have been duly carried on by the Inspector. 183 notices to whitewash were served. 65 cases of defective flagging were referred to the Surveyor. 25 Nuisance Removal Notices were served upon occupiers and owners, and duly enforced. 8 illegally occupied cellars were cleared, and, lastly, 5,063 ashpits were cleansed by the contractor during the year.

Tables, &c.

The various details connected with the mortality and meteorology of the year are fully set forth in the annexed tables, of which No. I. gives the causes of death, arranged under various epochs of age, with the relative numbers of the sexes. No. II. gives the weekly mortality, according to their death causes, condensed in classes, the quarterly returns of births, and averages of the meteorological phenomena for the weeks, quarters, and the year, compiled from Mr. Hartnup's daily record. No. III. gives the causes of death for each week of the year in full detail. No. IV. gives the streets in which death from any cause occurred, distinguishing those in which a Zymotic death took place. No. V. gives the (lunar) monthly deaths from all causes, and from Zymotic disease, together with the monthly rate per 1,000 for each. And No. VI. specifies the occupations, &c., of all, who, either themselves, or whose members of family have died within the year.

Thanks are again due to Mr. Hartnup, for his kindness in supplying the Health Committee every week with the valuable results of his meteorological labors.

C. O. BAYLIS, M.D., M.R.C.S., &c.

Birkenhead Commissioners,
Health Department,
May, 1871.

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TABLE I.

Ætal Register of Deaths in Birkenhead (and Claughton,)

For the Year ending December 31st, 1870.

CAUSES OF DEATH.	AGE BELOW.														SEX.		TOTALS.
	1	2	5	10	15	20	30	40	50	60	70	80	90	100	Males.	Females.	
FROM ALL CAUSES.	255	72	78	35	17	17	60	79	80	56	52	41	12	1	434	421	855
I.—Zymotic Diseases	60	27	34	12	7	5	5	2	9	1	.....	2	.....	.....	74	90	164
II.—Diseases of uncertain or variable Seat	.....	.....	1	2	1	.....	1	4	12	6	1	4	.....	.....	17	15	32
III.—Tubercular Diseases	17	13	9	8	5	7	24	30	18	9	3	.....	.....	.....	69	74	143
IV.—Diseases of the Brain, Nerves, &c.	48	7	14	4	.....	.....	6	4	4	8	5	5	.....	.....	55	50	105
V.—Diseases of the Heart and Blood Vessels	1	.....	.....	.....	1	2	3	6	6	3	8	4	2	.....	18	18	36
VI.—Diseases of the Lungs, &c.	48	13	14	1	.....	.....	5	5	16	14	17	8	1	.....	70	72	142
VII.—Diseases of the Stomach, Liver, &c.	9	2	2	1	.....	.....	2	6	8	4	2	2	.....	.....	15	23	38
VIII.—Diseases of the Kidneys, &c.	.....	.....	.....	1	1	.....	.....	6	... ..	2	1	1	.....	.....	8	4	12
IX.—Diseases of the Uterus, &c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
X.—Diseases of the Bones, &c.	.....	1	.....	2	.....	.....	1	.....	.....	1	.....	.....	.....	.....	2	3	5
XI.—Diseases of the Skin, Cellular Tissues, &c.	5	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	.....	2	5	7
XII.—Premature Birth, Teething, &c.	27	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	13	33
XIII.—Childbirth and Paramenia	.....	.....	.....	.....	.....	.....	1	2	.....	.....	.....	.....	.....	.....	.....	3	3
XIV.—Old Age	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	9	13	9	1	15	20	35
XV.—Atrophy and Debility	34	1	2	1	.....	.....	.....	1	.....	.....	1	1	.....	.....	20	21	41
XVI.—Deaths from Violence	2	2	2	3	2	2	11	11	4	4	3	.....	.....	.....	40	6	46
Causes not Specified	4	.....	.....	.....	.....	.....	1	2	3	1	2	.....	.....	.....	9	4	13
I.—Small Pox	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2
Measles	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Scarlatina	3	4	13	4	3	1	.....	.....	.....	.....	.....	.....	.....	.....	13	15	28
Diphtheria	.....	1	1	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1	4	5
Whooping Cough	10	6	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	14	21
Fever—Typhus—Enteric, &c.	... ...	1	2	2	3	3	4	1	3	1	.....	1	.....	.....	11	10	21
Diarrhœa	31	6	2	1	.....	.....	.....	1	2	.....	.....	1	.....	.....	21	23	44
Cholera	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dysentery	.....	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1	1	2
Croup	6	7	9	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10	13	23
Cynanche	4	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	3	6
Erysipelas and Pyœmia	3	.....	.....	.....	.....	.....	1	... ..	1	.....	.....	.....	.....	.....	2	3	5
Puerperal Fever	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1	1
Syphilis	3	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	3	1	4
Purpura	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
II.—Dropsy	.....	.....	.....	2	.....	.....	.....	2	4	2	.....	2	.....	.....	7	5	12
Cancer	.....	.....	.....	.....	.....	.....	1	2	5	3	.....	2	.....	.....	5	8	13
Gangrene	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1	1	2
Rheumatism	.....	.....	.....	.....	1	.....	.....	.....	3	1	.....	.....	.....	.....	4	1	5
III.—Scrofula	6	2	1	1	.....	.....	.....	2	1	.....	.....	.....	.....	.....	7	6	13
Hydrocephalus	7	8	5	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	13	10	23
Phthisis	.....	2	3	5	3	7	24	28	17	9	3	.....	.....	.....	45	56	101
Tabes Mesenterica	4	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	2	6
IV.—Inflammation of Brain, &c.	3	2	3	2	.....	.....	1	1	... ..	.....	1	.....	.....	.....	8	5	13
Apoplexy—Paralysis	1	.....	.....	.....	.....	.....	1	3	4	3	4	5	.....	.....	12	11	23
Epilepsy—Chorea	.....	.....	.....	.....	.....	.....	2	.....	.....	2	.....	.....	.....	.....	2	2	4
Convulsions	41	4	10	2	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	29	29	58
Tetanus—Trismus	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Disease of Brain, &c.	3	1	1	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	4	3	7
V.—Disease of Heart	1	.....	.....	.....	1	2	2	4	4	3	8	4	2	.....	14	17	31
Disease of Blood Vessels	.....	.....	.....	.....	.....	.....	1	2	2	.....	.....	.....	.....	.....	4	1	5
VI.—Tracheitis—Laryngites	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Bronchitis	25	7	6	1	.....	.....	3	2	10	11	14	6	1	.....	45	41	86
Pneumonia	22	5	8	.....	.....	.....	2	1	3	2	2	1	.....	.....	21	25	46
Asthma	.....	.....	.....	.....	.....	.....	.....	.....	1	1	1	.....	.....	.....	1	2	3
Disease of Lungs, &c.	1	.....	.....	.....	.....	.....	.....	2	2	.....	.....	1	.....	.....	2	4	6
VII.—Stomatitis—Pharyngitis	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Inflammation of Stomach, Bowels	6	1	2	1	.....	.....	1	1	.....	1	.....	.....	.....	.....	5	8	13
Disease of Stomach, Bowels	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	1	2	3
Peritonitis	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	2	2
Disease of Liver—Jaundice	2	.....	.....	.....	.....	.....	.....	4	6	3	1	1	.....	.....	8	9	17
Tumor—Abscess—Hernia	.....	1	.....	.....	.....	.....	... ..	.....	1	.....	1	.....	.....	.....	1	2	3
VIII.—Disease of Kidneys	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	1	1	2
Disease of Bladder—Prostrate	.....	.....	.....	.....	.....	.....	.....	1	... ..	.....	.....	1	.....	.....	1	1	2
Nephria—Albumenuria	.....	.....	.....	1	1	.....	.....	3	.....	1	1	.....	.....	.....	6	1	7
Nephritis	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	1
X.—Disease of Bones, Joints	.....	1	.....	2	.....	.....	1	.....	.....	1	.....	.....	.....	.....	2	3	5
XI.—Disease of Skin	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2
Disease of Cellular Tissue	3	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	.....	2	3	5
XII.—Premature Birth	19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	10	19
Teething	8	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11	3	14
XIII.—Childbirth	.....	.....	.....	.....	.....	.....	1	2	.....	.....	.....	.....	.....	.....	.....	3	3
XIV.—Old Age	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	9	13	9	1	15	20	35
XV.—Atrophy and Debility	34	1	2	1	.....	.....	.....	1	.....	.....	1	1	.....	.....	20	21	41
XVI.—Accidentally Killed	.....	.....	.....	.....	.....	.....	3	1	1	.....	.....	.....	.....	.....	5	.....	5
Burns, Scalds	2	2	.....	1	.....	.....	.....	1	1	.....	.....	.....	.....	.....	5	2	7
Drowning, Asphyxia	.....	.....	1	.....	.....	.....	2	4	2	1	1	.....	.....	.....	9	2	11
Wounds, Blows, Crushes, Falls, &c.	.....	.....	1	2	2	2	6	5	.....	3	2	.....	.....	.....	21	2	23
Causes not Specified	4	.....	.....	.....	.....	.....	1	2	3	1	2	.....	.....	.....	9	4	13
MALES	130	35	48	16	11	9	32	41	35	32	30	18	51	4	34	.....	855
FEMALES	125	37	40	19	6	8	28	38	44	24	22	23	7	0	.....	421	

IRTHS, AND WEEKLY AVERAGES OF
(AND CLAUGHTON.)

WEEKS.									Third Quarter.	WEEKS.															Fourth Quarter.	Year.
32	33	34	35	36	37	38	39			40	41	42	43	44	45	46	47	48	49	50	51	52			
8	4	8	5	2	2	5	2	48		3	4	2	4	4	1	4	5	3	4	5	2	2	43	164	
1	..	..	1	1	..	..	..	6		..	..	1	1	..	1	2	..	1	..	1	..	2	9	32	
1	3	6	6	2	..	2	2	36		5	1	2	3	3	3	1	1	7	6	4	2	7	45	143	
2	4	2	3	2	2	3	..	33		..	2	1	3	4	1	2	2	1	3	5	3	4	31	105	
1	..	..	..	1	1	..	1	5		..	2	1	1	1	2	1	..	..	2	..	1	1	14	38	
2	1	..	1	1	1	1	..	17		1	2	4	3	2	4	2	3	3	3	8	11	12	58	142	
..	1	2	..	..	2	..	..	10		..	2	..	1	1	..	1	2	1	1	1	1	2	13	38	
..	1	..	..	..	..	..	..	1		1	..	..	1	..	..	..	..	1	..	..	..	1	4	12	
..	..	..	..	..	..	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
..	1	..	..	..	..	1	..	2		..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	
1	..	..	1	..	..	..	..	2		..	..	..	..	..	..	2	..	..	..	..	1	1	7	7	
1	1	3	2	1	..	1	..	15		..	..	..	..	..	..	..	..	2	..	1	1	..	1	33	
..	..	..	..	..	..	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	1	3	
2	1	..	..	1	1	..	..	6		1	1	1	4	1	..	1	4	..	1	..	2	2	16	35	
..	1	2	3	..	1	1	1	14		1	1	..	1	1	..	..	..	..	..	2	2	3	8	41	
..	..	..	2	..	6	1	..	15		1	..	1	1	..	1	..	..	1	5	1	..	3	14	46	
..	..	..	..	1	..	..	1	3		..	..	1	..	..	..	..	..	..	..	..	..	..	1	13	
19	18	23	24	12	17	15	7	211		12	15	15	19	20	16	14	18	21	25	27	22	40	264	855	
								431															420	1792	
									42·8														43·9		
									39·2																
									89·2																
									86·9																
									81·5																
									7·61																
									9·6																
									9·5																
									57·1																
									5·9																
									57·7																
									80·3																
									98·4																
									67·2																
									55·8																
									84·5																
									4··2																
									101																
									32·7																
									43·2																
									5·12																
									1·4																
									5																
38	5	0·0	0·0	38	64·2	58·9																			
42·0	210·1	10·08																							
4·4·9																									
29795																									

ead having eight days.

TABLE II.

CONDENSED WEEKLY REGISTER OF DEATHS, A QUARTERLY REGISTER OF BIRTHS, AND WEEKLY AVERAGES OF METEOROLOGICAL PHENOMENA DURING 1870, IN BIRKENHEAD (AND CLAUGHTON.)

CAUSES OF DEATH.	WEEKS. 1	2	3	4	5	6	7	8	9	10	11	12	13	First Quarter.	WEEKS. 14	15	16	17	18	19	20	21	22	23	24	25	26	Second Quarter.	WEEKS. 27	28	29	30	31	32	33	34	35	36	37	38	39	Third Quarter.	WEEKS. 40	41	42	43	44	45	46	47	48	49	50	51	52	Fourth Quarter.	Year.
I.—Zymotic Diseases	3	3	3	4	7	8	2	2	2	4	2	2	2	44	..	..	3	4	2	..	2	..	3	..	4	3	1	7	29	..	5	1	4	2	8	4	8	5	2	2	5	2	48	3	4	2	4	4	1	4	5	3	4	5	2	2	43	164
II.—Diseases of uncertain or variable seat	2	1	1	..	2	..	..	..	2	..	..	..	1	11	1	..	1	..	1	1	1	..	..	..	..	..	1	..	6	..	..	..	1	1	1	..	..	1	1	..	..	6	..	..	1	1	..	1	2	..	1	..	1	..	2	9	32
III.—Tubercular Diseases	3	3	2	5	2	3	3	3	1	1	2	4	3	35	3	1	1	4	..	3	2	2	1	1	3	3	3	3	27	3	2	2	3	3	1	3	6	6	2	..	2	2	36	5	1	2	3	3	3	1	1	7	6	4	2	7	45	143
IV.—Diseases of the Brain, Nerves, &c.	..	..	1	..	2	1	4	1	1	4	..	1	4	12	2	2	3	1	2	..	..	..	1	4	3	3	..	1	22	3	2	2	3	5	2	4	2	3	2	2	3	..	33	..	2	1	3	4	1	2	2	2	3	5	3	4	31	105
V.—Diseases of the Heart and Blood Vessels	..	..	1	..	1	..	2	..	..	..	..	..	..	8	..	..	..	..	..	..	..	..	2	2	..	..	..	..	9	..	..	..	1	..	1	..	..	..	1	1	..	1	5	..	2	2	1	1	1	2	1	..	2	..	1	1	14	36
VI.—Diseases of the Lungs, &c.	..	6	4	5	1	4	5	4	3	4	2	3	2	43	3	2	5	4	3	2	..	..	..	1	1	1	3	3	24	2	1	2	1	4	2	1	..	1	1	1	1	17	1	2	4	3	2	4	2	3	3	3	8	11	12	58	142
VII.—Diseases of the Stomach, Liver, &c.	1	..	..	1	2	1	..	1	..	..	1	1	1	9	1	..	..	..	..	..	1	..	1	1	1	1	..	..	6	1	..	3	..	1	..	1	2	..	..	2	..	..	10	..	2	..	1	1	..	1	2	1	1	1	1	2	13	38
VIII.—Diseases of the Kidneys, &c.	..	1	..	1	..	..	..	..	..	1	..	..	..	3	1	..	..	..	..	..	..	..	..	1	1	1	..	..	4	..	..	..	..	..	1	..	..	..	..	..	..	..	1	1	..	..	1	..	..	..	1	..	..	..	1	4	12
IX.—Diseases of the Uterus, &c.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
X.—Diseases of the Bones, &c.	..	..	..	..	..	1	..	..	..	..	..	1	..	2	2	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	7
XI.—Diseases of the Skin, Cellular Tissue, &c	1	..	1	..	..	..	..	..	..	..	1	..	..	2	2	..	..	1	..	..	1	..	..	..	..	..	..	..	2	..	..	..	..	..	1	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	7	33
XII.—Premature Birth, Teething, &c.	..	1	..	..	2	..	1	1	..	3	..	..	..	8	1	..	1	1	1	..	1	..	..	..	..	..	..	..	5	..	1	..	3	..	1	1	3	2	1	..	1	..	13	..	..	..	..	..	..	2	..	2	..	1	1	..	1	7	33
XIII.—Childbirth and Paramenia	1	..	..	..	..	1	..	..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	3
XIV.—Old Age	..	1	1	..	2	..	1	1	..	..	..	..	..	6	4	1	..	..	1	..	..	1	..	..	..	..	..	..	7	..	..	..	..	1	2	1	..	..	1	1	..	..	6	..	1	1	1	4	1	..	1	4	..	1	..	2	16	35
XV.—Atrophy and Debility	..	2	1	2	..	..	..	..	..	..	..	3	..	9	..	..	..	1	..	..	1	..	..	..	4	1	1	..	10	2	..	1	1	1	..	1	2	3	..	1	1	1	14	1	1	..	..	1	1	..	..	..	..	..	2	2	8	41
XVI.—Deaths from Violence	1	..	1	2	1	1	..	1	..	..	..	1	2	12	..	..	..	..	2	..	..	..	1	..	..	1	..	..	5	2	2	2	..	..	..	..	..	2	..	6	1	..	15	1	..	1	1	..	1	..	..	..	1	5	1	..	3	14	46
Causes not Specified	2	..	..	1	..	..	1	..	..	..	..	..	..	4	..	..	..	..	..	..	1	..	..	..	1	1	..	..	5	..	..	1	..	..	..	..	..	1	..	..	1	..	3	..	..	..	1	..	..	..	..	..	..	..	..	..	1	13
TOTAL FROM ALL CAUSES	14	18	16	21	23	19	19	16	12	16	13	17	14	218	16	9	16	18	9	9	7	10	9	16	17	12	14	162	13	13	14	18	18	19	18	23	24	12	17	15	7	211	12	15	15	19	20	16	14	18	21	25	27	22	40	264	855
Total Births														480														461													431														420	1792
Westerly Winds (including due South)	73·8													45·5														77·9														57·1														
Cloud Averages per cent	64·2													67·0														60·3														50·1														
Rainfall in inches	1·05													6·45														3·47														5·23														
Rainfall in hours	25·9													111·9														89·9														69·4														
Thermometer Means	43·6													39·0														54·3														60·8														
Thermometer Means (20 Years' Average of)	38·8													40·6														53·0														59·3														
Barometer Means	29·454													29·981														30·080														30·013														
	29·658													30·041														29·923														30·113														
	30·469													30·187														29·861														29·570														
	30·350													30·151														30·133														29·479														
	29·672													30·101														30·080														29·330														
	29·986													30·105														29·828														30·279														
	30·237													29·745														30·128														29·886														
	29·667													30·015														30·105														29·346														
	29·700													30·265														29·954														29·318														
	30·180													29·961														29·807														30·409														
	29·945													30·161														29·517														30·031														
	30·085													30·043														30·156														29·560														
	30·346													30·197														30·305														29·886														
														30·065														30·373														30·073														
														29·795														30·080														29·795														

	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Year.
Westerly Winds (including due South)	45·5	77·9	57·1		
Cloud Averages per cent	67·0	60·3	50·1		
Rainfall in inches	6·45	3·47	5·23		
Rainfall in hours	111·9	89·9	69·4		
Thermometer Means	39·0	54·3	60·8		
Thermometer Means (20 Years' Average of)	40·6	53·0	59·3		
Barometer Means	29·981	30·080	30·013		
	30·041	29·923	30·113	29·795	44·9
	30·187	29·861	29·570	44·9	42·0
	30·151	30·133	29·479	42·0	210·1
	30·101	30·080	29·330	10·98	10·98
	30·105	29·828	30·279	64·2	64·2
	29·745	30·128	29·886	48·9	48·9
	30·015	30·105	29·346		
	30·265	29·954	29·318		
	29·961	29·807	30·409		
	30·161	29·517	30·031		
	30·043	30·156	29·560		
	30·197	30·305	29·886		
	30·065	30·373	30·073		
			29·795		

NOTE.—*The Weeks end January* 7, 14, 21, *and so on through the year,—the last or* 52*nd having eight days.*

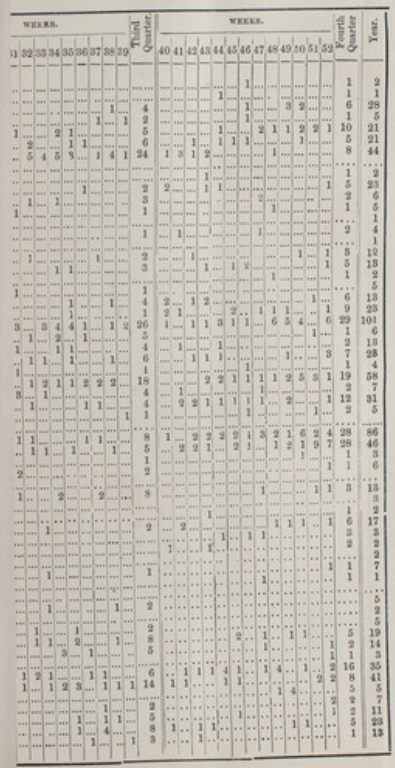


TABLE III.

Weekly Register of deaths in Birkenhead (and Claughton), 1870.

CAUSES OF DEATH.	WEEKS. 1	2	3	4	5	6	7	8	9	10	11	12	13	First Quarter.	WEEKS. 14	15	16	17	18	19	20	21	22	23	24	25	26	Second Quarter.	WEEKS. 27	28	29	30	31	32	33	34	35	36	37	38	39	Third Quarter.	WEEKS. 40	41	42	43	44	45	46	47	48	49	50	51	52	Fourth Quarter	Year.
Class I.—Small Pox																											1	1																										1	2
Measles																																																							1	1
Scarlatina	1		1	1	4	2	2	2			1	2		16									1		1			2		2		1							1	4					1					3	2			6	28
Diphtheria																								1			1	2													1	2					1							1	5
Whooping Cough										1				1		1						2			1	1		5		1			1			2	1				5					1					2	1	1	2	2	1	10	21
Fever—Typhus, &c.	1	2	1	1						1				6		2	1			1								4		1		1		2			1	1			6			1		1	1	1			1			5	21
Diarrhœa													2	2			3	2						1	1		3	10			1		5	4	5	3		1	4	1	24	1	3	1	2				1						8	44
Cholera																																																								
Dysentery					1									1																															1										1	2
Croup	1	1	1	2	2	3			1					11					1				1	1		2	5			1						1				2	2			1	1				2				1	5	23
Cynanche and Aphthæ										1				1																1			1		1					3													2	6
Erysipelas and Pyæmia						2					1			3																			1								1													1	5
Metria (Puerpural Fever)								1						1																																									1	1
Syphilis						1								1																	1										1		1									1	4
Purpura									1					1																																								2	1
,, II.—Dropsy	1							1				1		3	1				1	1	1					1		4					1								2			1								1	3	12
Cancer &c.						1			1				1	3			1								1			2				1				1	1				3				1	2							1	2
Gangrene													1	1																																									5
Rheumatism	1	1	1		1									4																			1								1											6	13
,, III.—Scrofula		1												1		1									1			2	1		1					1			1		4	2		1	2								1	9	23
Hydrocephalus				3		1	1	1	1	1				9						1	1			1			4								1						1	2	1						1	1			6	29	101
Phthisis	3	2	2	2	2	2	2	2			1	4	3	25	3		1	4		2	1	2	1		2	3	2	21	1	2	2	3	3		3	4	4	1		1	2	26	1		1	1	3	1	1		6	5	4		6	29	101
Tabes Mesenterica																																																						2	13
,, IV.—Inflammation of Brain, &c.									1		1			2	1	2							1		1			5		1			1			1	1				4		1				1							3	7	28
Apoplexy and Paralysis				1		1		2						4			3						2	1			6	1		1		1	1		1			1		6		1	1	1					1			3	1	4
Epilepsy and Chorea												1		1				1										1				1									1													1	4
Convulsions, Tetanus, and Trismus					1	1	2	1	3			3	1	12	1			1			1		1	3	1	1		9	2	1	1	3		1	2	1	1	2	2	2		18			2	2	1	1	1	1	1	2	5	3	1	19	58
Disease of Brain, &c.																																	3		1						4		1											2	7
,, V.—Disease of Heart and Pericardium						1		2		2				7								2	2		2	1	1	8			1		1		1		1	1			4		2	2	1	1	1	1	1		2			12	31
Disease of Blood Vessels			1											1											1			1												1	1												2	5
,, VI.—Laryngitis																																																							
Bronchitis		5	3	5		3	5	1	2	3	2	1	1	31	2	1	4	2	3	2				1	2	1	1	19	2		1	1	1	1			1	1			8	1		2	2	2	1	3	2	1	6	2	4	28	86
Pneumonia		1				1		2		1		2	1	8	1	1	1	2										5		1			1	1			1				5		2	2	1		2	1		1	2	1	9	7	28	46
Asthma									1					1																1											1													1	3
Disease of Lungs, &c.				1		1				1				3																		2								2													1	6
,, VII.—Stomatitis																																																						
Inflammation of Stomach and Bowels					1							1		2																											1	2												1	3	13
Disease of Stomach and Bowels	1												1	2												1		1													8													1	3
Peritonitis							1							1																																								1	2
Disease of Liver				1	1				1			1		4	1				1		1	1	1					5			1			1							2		2										1	6	17
Hernia, Abscess, and Tumors																																																						3	3
,, VIII.—Disease of Kidneys																																																					2	2
Disease of Bladder and Prostrate											1			1	1													1																											1	2
Nephria and Albumenuria		1		1										2									1	1	1			3						1							1													1	1
Nephritis																																																							
,, IX.—Disease of Uterus																											1	1														2													3	5
,, X.—Disease of Bones and Joints						1					1			2														1						1							2													2	2
,, XI.—Disease of Skin				1										1				1										1													2													2	5
Disease of Cellular Tissue, Abscess &c.	1											1		2							1							1													1													5	19
,, XII.—Premature Birth						2		1	1		1			5		1												1					3		1	1		2			8					2		1		1	1		1	2	14
Teething		1								2				3	1			1	1		1							4		1					3		1				5													1	3
,, XIII.—Childbirth	1						1							2																																								2	16	35
,, XIV.—Old Age		1	1		2		1	1						6	4	1			1			1					7				1	2	1			1	1			6		1	1	1	4	1		1	4		1	2	2	8	41
,, XV.—Atrophy and Debility		2	1	2								3		9		1	1	1		1			4	1	1			10	2		1	1	1		1	2	3		1	1	14	1	1			1	1					1	4			5	5
,, XVI.—Accidentally Killed																																																					2	2	7
Burns—Scalds				1								2		3														1	1										1		2													1	2	11
Drowning and Asphyxia				1			1		1					3						1								1	1										1		5													5	23
Wounds, Blows, Crushes, Falls, &c.	1			1	1						1		2	6			2						1		1		4		1	2					1		4			8	1		1	1						1	1			5	23
Causes not specified	2			1			1							4			2						1	1	1		5			1						1			1	3		1											1	13

TABLE IV.

STREET REGISTER OF DEATHS.

Streets.	Total from all causes.	From Zymotic Causes only.	Streets.	Total from all causes.	From Zymotic Causes only.
At Sea.....	1	0	Bidston Road	1	0
Abbot Street	6	2	Back Myrtle Street	2	0
Albion Street	3	1	Borough Road ...	2	0
Albion Terrace ...	3	0	Birkenhead	69	0
Albert Terrace...	1	0	Berner Street	1	0
Castle Buildings	1	0	Back George Street	3	0
Market Bdgs.	1	0	Byrom Street	2	1
Hamilton Terrace	4	0	Cambridge Place...	1	0
Arthur Street	3	1	Camden Street ...	4	0
Alma Street	1	0	Canning Street ...	3	0
Abbey Street	3	0	Cardigan Street ...	1	1
Alfred Road.....	1	0	Catheart Street ...	6	1
Austin Street	1	0	Chapel Street	1	0
Ashville Road.....	1	1	Chester Street.....	14	2
Adelphi Street ...	1	0	Chester Place ...	2	0
Back Arthur Street	1	0	Tory Place	1	0
Bridewell.....	1	0	Church Street.....	4	1
Barton Street	6	1	Clarendon Street...	5	1
Back Oliver Street	1	0	Claughton Road ...	8	0
Back Beckwith St.	8	1	Clifton Crescent ...	1	0
Back Price Street	2	0	Corporation Road	1	0
Back St. Anne St.	2	0	Christchurch Road	1	1
Beckwith Street ...	13	3	Conway Street.....	10	3
Byrom Place ...	4	1	Kent Place	4	1
Bentinck Street ...	5	2	Claughton Village	2	0
Brassey Street.....	3	2	Crown Street	4	1
Bridge Street	9	0	Cross Street	1	1
Brook Street	34	8	Cleveland Street...	7	3
Borough Hospital	11	3	Cleveland Avenue	1	0
Bertha Street	2	0	Brook Square ...	1	1
Bridge End Terrace	1	0	Blackpool Street...	2	0
Ball's Road.....	2	2	Ruabon Street...	2	1
Prince's Terrace	1	0	Wrexham Street	3	2
Bright Street	1	0	Denbigh Street	1	1
Brougham Street...	3	1	Camperdown Street	1	0

Table IV.—*Continued.*

Streets.	Total from all causes.	From Zymotic Causes only.	Streets.	Total from all causes.	From Zymotic Causes only.
Clayton Street.....	3	1	Grange Lane	13	1
Catherine Street...	1	0	Sussex Terrace	1	0
Claughton Range	1	0	Greenfield Street ..	2	1
Club Row	3	0	Great Float.....	2	1
Cavendish Road...	1	0	Grosvenor Road...	1	0
Dacre Street	1	0	Grange Mount ...	1	0
Davies Street	2	1	Gillbrook ...	1	0
Dock Cottages ...	13	3	Hamilton View ...	1	0
Derby Street	4	1	Hamilton Square...	3	1
Devonshire Place	1	0	Hamilton Street ...	4	0
Devonshire Road	3	0	Havelock Street ...	3	2
Duncan Street.....	2	1	Hope Street	5	1
Duke Street	3	0	Henry Street	6	1
Douglas Street ...	1	1	Horatio Street.....	2	1
Denbigh Street ...	2	0	Hampton Street ...	3	0
Dale Street.....	1	0	Ivy Street	9	1
Egerton Street ...	7	2	Ivy Terrace.....	1	0
Carpenters' Row	3	0	Jackson Street ...	2	1
Connor's Court	1	0	Kendal Street	1	0
Evans' Place	1	0	Leicester Street ...	3	0
Eldon Place	12	2	Laxey Terrace.....	1	1
Elgin Street	2	0	Lowther Street ...	5	0
Elizabeth Street...	4	0	Laird Street	2	0
Elizabeth Place ...	3	0	Lingdale Road.....	2	1
Exmouth Street ...	7	0	Market Place South	1	0
Eagle Court	1	1	Mortimer Terrace..	1	0
Edgar Street	3	1	Morpeth Buildings.	6	0
Euston Grove.....	1	0	Marion Street	3	0
Eton Place	1	0	Market Street	18	2
Fore Street.....	2	0	Meacock Street ...	2	0
Freeman Street...	1	1	Midland Street ...	4	2
Flamank Street ...	9	1	Moon Street	2	0
Forest Road	1	0	Myrtle Street	3	0
Frederick Street...	3	0	Mornington Street	3	3
Field Street	12	3	Marshall Street ...	1	1
Ferry Steam Boat	1	0	Monk Street	1	0
Grosvenor Place...	1	0	Myrtle Place	1	1
Grange Road	2	0	Mersey Street	2	0
Grange Street.....	1	0	Manor Gardens ...	1	1
George Street.....	2	0	Milton Road ...	1	0
Gladstone Street...	6	0	Neptune Street ...	4	1

Table IV.—*Continued.*

Streets.	Total from all causes.	From Zymotic Causes only.	Streets.	Total from all causes.	From Zymotic Causes only.
Nelson Street	2	0	St. Mary's Gate ...	4	3
Napier Street	2	2	Hughes' Buildings.	1	0
Oakfield View.....	2	0	Shrewsbury Road..	1	0
Oak Street	9	5	St. Mary's Avenue.	2	0
Old Bidston Road..	3	1	San Street	6	1
Old Chester Road..	2	0	Sydney Street.....	1	0
Godfrey's Terrace	1	0	St. John's Street...		
Mathew's Place..	1	1	St. John's Place	1	0
Oliver Place.....	4	0	St. Mary's Terrace	3	1
Oliver Street.....	11	2	Sussex Street	1	0
Miller's Place ...	1	0	Slatey Road	2	0
Oxton Road.....	11	4	St. Mary's Street...	1	1
Orderly Residence.	1	0	Stanley Road	2	0
Orderly House	1	0	Thomas Street ...	10	2
Priory Street	1	1	Tranmere Vale ...	6	0
Priory Court ...	2	1	,, Vale Terrace...	1	0
Pool Terrace	2	0	Taylor's Buildings.	5	3
Park Road South..	5	1	Thornwood	1	0
Park Street.....	1	0	Talbot House	1	1
Price Street.....	25	9	Upper Beckwith St.	7	1
German Terrace	1	0	Upton Road	1	0
Pool Street	1	0	Vine Street.....	8	2
Palm Hill	1	0	Vulcan Street	1	0
Prince's Terrace ...	1	0	Vicker Street	1	0
Pleasant Street ...	5	0	Wilbraham Terrace	2	0
Pilgrim Street.....	1	0	Watson Street.....	12	4
Parkfield.....			Waterloo Place ...	2	0
Parkfield Place..	2	1	Rushton's Court.	1	0
Plymouth Place.	1	1	Walton Street.....	3	2
Peel Street	5	2	Wesley Street.....	1	0
Park Road East ...	3	1	Westbourne Road..	4	2
Private Passage ...	1	0	White Street	9	2
Ross Terrace	1	0	William Street ...	5	1
Rock Terrace.....	1	0	Wilson Street	5	2
Russell Street.....	2	0	Windsor Street ...	5	1
Robert Street	3	1	Wood Street	10	0
Rimmer's Cottages	1	0	Warwick Street ...	4	0
Stanley Court ...	1	0	Wilkinson Street...	13	3
Sandford Street ...	2	0	Whitefield Place ...	1	0
Somerville Street..	1	0	Williams' Cottages.	2	2
St. Anne Street ...	17	3	Windsor Place ...	2	0

Table VI.—*Continued.*

Housekeepers	5	Stevedore	1
Hammermen	3	Shopwoman	1
Hairdressers	2	Shopman	1
Iron Plainer	1	Stationers	2
Iron Sawyer	1	Storekeepers	7
Joiners	21	Shipsmiths	2
Jeweller	1	Shipriggers	4
L. R. C. P.'s	1	Shipbuilders	2
Labourers	238	Stokers	5
Major	1	Shipkeeper	1
Missionary	1	Shoemakers	19
Manufacturer	1	Sawyers	5
Milliner	1	Surgeons	3
Merchants	8	Ship Carpenter	1
Messenger	1	Seamen	24
Ministers	2	Stonemasons	20
Machinists	4	Shipwrights	21
Master Mariners	7	Striker	1
Mariners	8	Sailmakers	2
Milk Dealer	1	Salesman	1
Optician	1	Silk Mercers	2
Provision Dealer	1	Shipowners	3
Pensioners	3	Saddlers	2
Painters	13	Ship Steward	1
Policemen	4	Schoolmaster	1
Publicans	12	Sub-Contractor	1
Porters	9	Smelter	1
Plasterers	5	Tailors	9
Plumbers	4	Timekeeper	1
Pattern Maker	1	Traveller	1
Pilot	1	Teachers	2
Printers	3	Unknown	8
Platers	2	Upholsterer	1
Railway Official	1	Wheelwrights	3
Railway Checker	1	Warehousemen	6
Railway Shunter	1	Watermen	6
Riveters	2	Watchmakers	2
Railway Manager	1	Well Sinkers	2
Single Woman	1	Watchman	1

A SUMMARY

OF THE

Principles of a Comprehensive Measure

FOR THE

Improvement of the Sanitary Laws,

BY

HENRY W. RUMSEY, M.D., F.R.C.S.,

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Hon. Mem. Metrop. Assoc. Med. Offs. Health.

LONDON:

WILLIAM RIDGWAY, PICCADILLY.

PREFATORY NOTICE.

This Paper would probably have been read at the Social Science Congress, now assembled at Plymouth, had the author been able to attend. It was drawn up for the consideration of the Health Department of that Association, when discussing the first of their "Special Questions," named for this meeting.

As a mere summary, it deals very briefly with the several principles proposed. The arguments for most of them, and the objections to the serious defects in the machinery established by the Public Health Act, 1872, may be seen in the Reports of the Joint Committee on State Medicine of the British Medical and Social Science Associations, 1871 and 1872; also, in the Memorial addressed by that Committee to the President of the Local Government Board, on April 8th, 1872.*

The author also begs to refer his readers to the following recent articles and papers on the subject:—

(1) "Sanitary Legislation."—*Brit. and For. Med. Chir. Rev.*, Jan., 1872. (2) "Impending Sanitary Legislation."—*Pall Mall Gazette*, March 14. (3) "Mr. Stansfeld's Bill."—*Ibid*, March 20. (4) "Sanitary Inspection and Medical Officers of Health."—*Ibid*, April 1. (5) "Amendments in Mr. Stansfeld's Public Health Bill."—*Lancet*, June 1, p. 761. (6) Several papers and reports in the *British Medical Journal*, vol. 1, 1872, especially at pages 161, 215, 297-9, 321-3, 401-5, 425, 454, 586, 651, 675. (7) Lord Fortescue's Letter on the Bill, with reference to County Management.—*Pall Mall Gazette*, July 1. (8) "The Public Health Bill."—*Ibid*, July 25. (9) A Letter to Lord Salisbury on the Public Health Bill, by Gilbert W. Child, M.D., F.R.C.P.; Longmans, 1872.

Cheltenham, September, 1872.

* These documents may be obtained of the General Secretary of either of those Associations; at the Office of the S. S. A., 1 Adam Street, Adelphi; or at the Office of the B. M. A., 37 Great Queen Street, W.C.

SUMMARY OF PRINCIPLES, &c.

In treating of this subject, I assume that certain primary or underlying principles are conceded. For it is a fact that many axioms of Sanitary Law are fully recognized by old Statutes or by the Common Law. And one of these underlying principles is that of MUTUAL RESPONSIBILITY.

"Man to man must bring relief."

"So use your own that you injure not another."

"Take your share of service in your guild."

Primitive as these maxims may be, we must come back to them, even under the most elaborate system of polity, or society will become an effete, dependent, over-governed and corrupt mass of human life. What we call *Local Self Government* also must be founded on these maxims, or else it will deteriorate, as it has already deteriorated in most places.

At the first meeting of this association, an eminent official, whose wide experience enabled him to speak with authority, sadly but positively asserted this progressive decadence of local effort.

Happily, it is no longer necessary to call the attention of the legislature and the administrative authorities to the paramount importance of improving the general health of the people and of promoting the vigour and efficiency of the race. For some of the principles which I shall submit have been already sanctioned by Parliament, and therefore have not now to be urged,—although, for the sake of completeness of view, they are included in the following sketch. Without waste of words, then, I come to English laws and authorities as they are.

The object of sanitary reformers is to ascertain, and to shew, how these laws and authorities may be amended for the purposes of future sanitary administration.

Here, again, I grant beforehand, as fully as the most ardent advocate of education and self improvement could demand, that the elements of Physiology and Hygiene ought to be taught, or taught better than they are, in all our schools,—whether primary or secondary or collegiate,—whether maintained by the state or by endowments, or by the higher and middle classes who use them.

This kind of education is necessary for two reasons: first, because among a well-informed people stringent details of law are the less necessary,—and secondly, because those regulations which are absolutely necessary for every community are more reasonably administered and more heartily obeyed by an instructed people.

What, then, subject to the preceding conditions and limitations, are the main principles which should guide the legislature and the constituted authorities in these matters?

Liability of property for sanitary improvements.

I.—First, I would name the Liability of Property *to bear the burden of sanitary improvements*;—*i. e.* to provide dwellings fit for human habitation, upon sufficient superficial space, with a due supply of wholesome water, and with all necessary structural means of preserving health, under penalty for non-fulfilment of obligation.

No sale or tenure of property should be permitted which ignores or violates this principle.

When owners of property have fulfilled their obligations, occupiers should be answerable, under penalty, for the observance of all sanitary regulations.

Extension of time for defraying cost of improvements.

II.—*The distribution of the primary cost of permanent improvements*, such at least as are required by sanitary law—whether of a public nature and charged on the rates, or of private property at the cost of the owner—over a sufficient number of years to prevent the burden falling unreasonably upon the present generation.

Local authorities should also have power to mortgage the land purchased for public works, and in some cases even the works themselves.

Encouragement of local effort.

III.—*The encouragement of local and provincial effort in administration.* This is indispensable; for the administrative life of a nation may be destroyed by being brought to depend on the action of a central authority and its emissaries.

Choice of best men for local administration.

IV.—*The selection or election of the best men that can be found to do the work in each place.*

Selection involves the existence of a superior power to select. Though of great value in the specialities of administration, it cannot safely be pushed to extremes in a democratically governed people.

Election, if merely by the ignorant, the self-seeking and the obstructive, may produce evils more serious even than those caused by central dictation; and unless it represents in due proportion the views of those who, from position, education and pursuits, are more competent to elect, and less biassed by grovelling interests, it tends doubtless to invalidate the administration of even the best laws.

The selection of committees, containing a nominated element, for special purposes, or for portions of districts requiring the application of particular measures, has been judiciously sanctioned by Mr. Stansfeld, who has also risen superior to the political fallacy, hitherto in favour with Parliament and even with the Sanitary Commission, namely, that for the management of any such portion of a district, a body chosen by its inhabitants must be constituted. This false maxim led to the formation of new vestries for the management of the "Special Drainage Districts" of the Act of 1866. But these districts are now judiciously dissolved, or included as contributory places in larger areas, and are probably to come under the new local committees to be appointed by rural authorities, with at least one-third of *ex-officio* members.

A like rubbing-out process might be beneficially extended to a multitude of petty, yet obstructive, local-board districts, especially in the north of England.

Common and Special objects of local administration.

V.—*A distinction to be drawn, at least in administration, between those public-health provisions which are common to the whole surface of the country, and those which are more or less special and applicable only to limited areas.*

As examples of common objects, I may mention—Statistical returns, inquiries and records, concerning both persons and dwellings,—public medical service, whether curative or preventive,—dispensaries and hospitals,—proceedings under the Diseases Prevention Act,—public vaccination,—purity of drinking-water,—genuineness of food and drugs,—scientific investigations and reports. The following, though "common objects" also, should be subject to more precise regulations in the denser populations, viz., removal of nuisances,—disposal of *excreta*, human and animal,—water supply,—sale of food,—prevention of over-crowding,—repair, closure or demolition of unhealthy dwellings,—and burial of the dead.

As examples of purely special objects in limited areas, may be mentioned—the drainage and sewerage of particular districts,—the prevention of river pollution,—the sanitation of ports, shipping and infected sailors or passengers,—the relief and prohibition of over-density of population,—and the control of certain occupations, processes and manufactures, for the sake of the health of both the public and the operatives. It is probable also that, for some time to come, the authorized methods of disinfection, under the Contagious Diseases Acts, will be only of special and limited application.

The charge of the first group of objects should be distributed, on an uniform system, over the whole population, but under more stringent rules for towns. The cost of special objects should be limited to particular places or communities, and the measures

administered by their constituted authorities, or, where there are no town boards, by local committees appointed by a wider authority. We are thus led to another fundamental principle:—

Areas for common objects.

VI.—*The formation or definition of the areas in which all the common objects of health administration are to be carried into effect by single authorities throughout the whole country.*

Existing divisions, with which the people have been long acquainted—as counties, boroughs, unions, parishes, or townships, should be respected, and as far as possible utilized; while higher responsibilities, more special functions, and ultimate action in case of default, should be committed to superior authorities in the wider areas.

The adoption of this principle does not determine whether the county, or the great city, or the parochial union shall be the UNIT of area for all sanitary purposes. But it does imply that *there are objects of sanitary law and administration which must not be undertaken by the smaller and more strictly local Boards*, although the boundaries and authorities of every place would be duly recognized in the general organization.

Identity of areas for vital statistics and for common objects.

VII.—*The identity of areas for Returns of Vital Statistics, with those for* COMMON *objects of sanitary management.*

This may be taken to be included in the preceding proposition; but the full recognition of the necessity for such "identity of areas" involves the adoption of the *Registration Districts*, with corrected boundaries, as Sanitary Districts; and since these for the most part correspond with parochial unions, in which the public Medical Relief of the country is administered and the Diseases Prevention Act carried into effect, all these statistical, medical and sanitary functions should be brought under one management in the same unit of area.

All that is necessary to complete this identity is—first, to adjust the limits of the Registration Districts

to the corrected boundaries of counties, as the largest spheres of local administration:—secondly, to harmonize the Registration Sub-districts with the Medical Relief Districts, so that a Dispensary, with one or more medical officers, might belong to each Registration Sub-district;—and thirdly, to require every Town Council or Local Board, acting also as Burial Board, within the same Registration District, to co-operate with the Board of Guardians, in electing a *District Council*, as the one local authority for sanitary and medical purposes in that district. (See xvii.) This important principle involves—

Reformed system of medical relief; including all public medical service.

VIII.—*An improved organization of* Medical Poor Relief; by the separation of drug supply from medical services, and the consequent general adoption of the Dispensary System, as lately introduced into the Metropolis, with modifications of that long established in Ireland. Also, *the comprehension, ultimately, of all Public Medical Attendance among the poor in the machinery for health-preservation.*

The prevalence of sickness, especially epidemics, and the excess of mortality, resulting in heavy burdens on the community and in the degradation of the race, are the real grounds for sanitary legislation. Hence, those who are either professionally or officially concerned with the diseases and deaths of the poorer classes are the first agents to be secured, for information as to the causes and extent of these physical evils.

Thus, medical officers of districts, workhouses, dispensaries, hospitals, factories, mines, government works and departments, police, prisons, reformatories, state-supported schools, and pauper asylums, should be engaged to contribute the facts on which any safe general conclusions as to causation must depend. Hence—

Registration of sickness.

IX.—*The public registration of all sickness, including injuries, attended at the public cost.*

Not merely the cases attended by the district medical officers, but also those relieved in the medical charities, should be returned.

Ultimately, this measure must be extended to cases among factory workers, miners, and government labourers, as well as to those relieved in clubs and provident institutions, so as to include the industrial pathology of the population, and thus form a guide to comprehensive measures of prevention.

The registration of sickness would, of course, follow the lines of the registration of births and deaths, and form part of the same machinery, by the help of the organization for medical relief.

The adoption of the last four propositions I believe to be essential to the completeness of any comprehensive code of public health.

Special qualification for chief officers.

X.—*The requirement of high qualification and special knowledge* in those officers whom it is necessary to employ for scientific inquiry and reports, for advice to local authorities, and for supervision of corrective measures, even in the best informed communities.

This true safeguard of administration should apply to engineers, surveyors, public analysts, medical officers of health, and medical jurists—perhaps even to nuisance officers.

The principle of competitive examination, so far as to secure an adequate standard of qualification, might be employed in the formation of a *corps*, from which future officers would be selected.

Use of local skill in the chief offices.

XI.—*The employment of men of local knowledge and experience as chief medical officers of health*, if known to possess the requisite qualifications, by having passed the test examinations, or by distinguished service as deputies. (See xiv.)

Prohibition of private practice; appointment by higher authorities.

These superintending officers ought to be debarred from private practice, and to be appointed by the higher order of local or provincial authorities, as those of counties or first-class boroughs.

The adoption of this principle constitutes the only reliable check to an exorbitant centralism: while it

would provide a very useful incentive to the efficient performance of duty in the subordinate offices, by the hope of promotion to the superior.

Protection of officers.

XII.—*The protection of these officers in the energetic, skilful, and independent discharge of duty*, by legal securities against dismissal, discouragement, or oppression, on the part of those who might suppose their interests to be endangered by the honest action of the officers.

Salaries of certain officers to be charged partly to the state and partly to the localities.

XIII.—*The cost of the superior officers, so appointed, to be divided between the State and the Communities*, as is now done in the case of the union medical officers;—because, on the one hand, their work is, to a great extent, of imperial concern, and their reports would have to be utilized for the benefit of the whole country; and, on the other hand, it is undesirable to increase the patronage of the central authority, by diminishing the responsibility of the communities in these appointments.

Use of district surgeons as deputies,

XIV.—*The employment of the medical officers of districts, dispensaries, or hospitals*—who, for the most part, depend mainly on other sources of income—as contributors of facts, and as *assistants* or *deputies* to those more special officers, who would be required to devote their whole time to the public service.

also of certifying factory surgeons.

XV.—*The employment, in the same relation, of the certifying surgeons of factories and workshops* (and ultimately of mines), with extended functions, constituting, as Mr. Inspector Baker has proposed, an effective machinery for improving the health of the operatives and the sanitary condition of work-places.*

Again, as to authorities:—

Combination of central authorities.

XVI.—*The combination of all central departments which have to do with matters of public health.*

* "As the district and town officers will have to do with *dwelling* places, so would factory surgeons with *work* places. The visitation of the one would be domiciliary, that of the other would be industrial." Both would be most valuable as deputies or assistants to the superintending health officer. [*Brit. and For. Med. Chir. Rev. Jan.*, 1872.]

This principle has been partially recognized by the Legislature. But there are other departments under Special Acts, not at present included;—and the combined authority should be aided, as it is not at present, by a permanent council of learned persons, eminent in pursuits connected with the public health, thus conferring on that authority greater moral influence than it can otherwise possess.

Combination of local authorities.

XVII.—*The compulsory combination or co-operation of those local authorities* which are concerned with the "common objects" (see v. and vii.) of health management within the same registration district, or first-class borough.*

Neither of these combinations, central or local, necessarily involves the dissolution or absorption of any existing departments or authorities; for each might continue to perform independently such other functions as may not strictly appertain to the public health.

For example, in central administration, the Factory Inspectors under the Home Office might continue to act as a distinct authority in the general and educational control of factories, while working with the central sanitary authority in matters of health preservation.

For example, also, in local administration, while providing for the unified administration of the "common objects" of sanitary management, the ordinary matters of local government in towns would remain undisturbed in the hands of Town Councils.

Limits to central action.

XVIII.—*The limitation of central action to consultation and advice, support and aid*, including the diffusion of information obtained by the central authority from the chief medical officers of health, the county and

* The *municipalities* of the Province of Düsseldorf are constituted the legal authorities for *Poor Relief*; and the Poor Law in Elberfeld and other places within that *Kreis*, is administered by the municipalities. [*First Report of Local Government Board*, 1872, p. 245.]

borough engineers, and the legal officers. Such information to be circulated generally and applied to particular local emergencies.

Inspecting circuits.

XIX.—*The division of England and Wales into* (eleven ?) *Circuits of Inspection*, to correspond with the divisions (corrected) of the Registrar-General, and to be substituted for the districts of the (late) Poor Law Inspectors.

To each of these circuits should be appointed one legal, one medical, and one engineering inspector, and no more,—all subject to and acting for the central authority.

Consolidation of statutes.

XX.—*The consolidation and simplification of statute;* so that less trouble may be given to the lawyers in interpreting, and to the people in understanding, sanitary laws.

In this respect, the labours of the Royal Sanitary Commission are entitled to our best acknowledgments.

Finally, since no complete or comprehensive scheme of health legislation would be at once accepted by the British Parliament, sanitary reformers must be content to go on patiently, step by step,—only with care that no step shall be taken which may embarrass the future consideration, or prevent the future adoption, of any correct principles of administration.

The extent to which the late measure of Government fulfils these conditions I will not now discuss.

So far as they are unfulfilled or possibly negatived by it, I am not disposed, on this occasion, to speculate on the motives, interests, and influences which may have been brought to bear on those who devised, or who finally shaped, the Act of 1872.

We shall all readily and gratefully acknowledge that the Royal Sanitary Commissioners and the Ministers of State, who planned this and the Act of 1871, have been actuated by an earnest desire to propose what they believed to be best calculated to further the ultimate objects which sanitary reformers have long endeavoured to promote.

It has been fully admitted that some very essential principles, which I have presumed to define, are now embodied in those Acts.

It will be also perceived that many other of these requirements stand over for future discussion.

It cannot fail to be seen, I am sorry to add, that there are *not a few* matters, of grave importance, in respect of which the Act of 1872 has created obstacles, more or less barring future progress, and very similar to those raised by former Acts, which have so greatly complicated and enhanced the difficulties of present legislation.

JOHN BELLOWS, PRINTER, STEAM PRESS, GLOUCESTER.

ON

FLUID MEAT.

A NEW PREPARATION OF MEAT,

ESPECIALLY ADAPTED TO

WEAK STOMACHS,

AND

FOR INVALIDS GENERALLY,

WITH

REMARKS ON FOOD.

BY

STEPHEN DARBY, F.C.S.

PHARMACEUTIST, &c.

LONDON:
JOHN CHURCHILL AND SONS, NEW BURLINGTON STREET.
1870.

ON

FLUID MEAT,

&c.

Any addition to the knowledge of human food, or any new variation imparted to it, must be interesting to all persons, but more especially to medical men at the present time when the regulation of diet has become an essential point of practice.

I therefore trust it needs no apology or further preface in offering this small pamphlet to their notice and consideration.

The separation of natural productions used as food into their proximate constituents has been very satisfactorily effected by chemistry, and the part performed by each in the function of nutrition, or in sustaining the temperature of the body, is to a great extent ascertained by the physiologist. There are, however, many points scarcely recognized by the lay public, and perhaps not sufficiently enforced by the profession, otherwise it would be difficult to account for the very

extensive use of substances containing little or no nourishment, under the mistaken idea that they are very nutritive and restorative. Thus almost pure starches bearing various names are recommended as food for children and delicate persons, or as restoratives for convalescents; and yet the profession are well aware of the necessity for the nitrogenous constituents of food, whether animal or vegetable, for the sustenance of health or the restoration of strength and vigour when impaired by disease. Indeed it would not be easy to find any natural fact more generally admitted than the superiority of animal flesh over every other form of food for repairing the waste arising daily and hourly from the exercise of every bodily and mental function.

Animal flesh, however, is a very complex substance. Denuded of the fats attached to it, and the large proportion of water making up its bulk,* it is composed of fibrine, albumen, gelatine,

* 1,000 parts lean beef contain—

Matters soluble in cold water	60 parts	Albumen coagulable by boiling	29·5
		Left in solution or boiling ..	30·5
		Gelatine	6·0
Insoluble in cold water	170 ,,	Fibrine, Membrane, &c.	164·0
Fat	20 ,,		
Water	750 ,,		
	1,000		

a group of matters termed in the aggregate extractive matters, and several saline substances. It is as a compound of all these that the lean of meat—the muscular fibre, vessels, membranes, juices, and salts—is more than anything else, able to sustain health and strength to build up the body in its growth, and to repair and replace the continuous waste, the loss of substance arising from wear and tear and all the actions of the living system.

When the several constituents of animal flesh are separated, no one of them is by itself capable of restoring the body or repairing the daily waste.

It has been ascertained by experiment quite conclusively, that neither fibrine, albumen, gelatine, nor extractive or saline matters severally and separately can afford efficient nourishment. Chemically considered, fibrine is quite insoluble; albumen is soluble in cold water, but is coagulated into an insoluble state in water at about 150° Fahrenheit; gelatine is soluble in hot water, but solidifies on cooling in combination with water. The saline constituents of flesh exist in it in conditions not perhaps accurately known. The

presence of some of them are probably essential to the constitution of fibrine and gelatine, but they undergo changes on separation, so that when we destroy their combination with the nitrogenized material, by burning or otherwise, the resulting ash or group of inorganic matter presents them to us in quite a different form.*

With respect to the extractive, it is itself highly compound. Treated chemically, (not by mere solution in water and evaporation,) several bodies are found in it—Creatine, Creatinine, Sarcosine, Inosite, &c.

It is very important to consider that these bodies are crystalline, and while they possess crystalline forms and properties they seem to have an intimate relation to the organic fibrine and albumen on the one hand, and to the ultimate form these take in the transformation which renders them effete and suited to be eliminated from the system, on the

* The following is the result of the analysis of Meat Ashes:—

Phosphoric Acid	36·60
Potash	40·20
Iron and Earth	5·69
Sulphuric Acid	2·95
Chloride of Potassium	14·86
	100·00

In the blood and tissues, Phosphorus, Sulphur, and Iron are probably in organic connection—not merely diffused through them as inorganic matter. They are oxidized in the process of separation by combustion.

other, namely, Urea. In other words, they are the first results of the molecular changes constantly going on,—the first steps towards the ultimate decomposition of the organized flesh.* This being so, we are less surprised that extractive should fail to sustain a healthy state of the blood and tissues and therefore life.

In confirmation of this view we have only to consider the universally acknowledged fact, that the quantity of extractive yielded by the flesh of wild animals and those destroyed in hunting far exceeds the amount we obtain from the flesh of stall-fed beasts. The life of ease and tranquillity, led by the latter, not producing by wear and tear the waste sustained by the former.

It is not the larger proportion of extractive in the flesh of game which renders it acceptable as food, but the flavor,—probably derived from the diet they procure; at the same time, it is admitted, that game, as generally eaten, is more suited to healthy than weak stomachs.

Be this as it may, we know that in perfectly

* Speaking of Extractum Carnis, Dr. Pavy says, "The preparation contains the salines with the various extractive principles, a considerable proportion of which, there are grounds for believing, consist of products of partial decay, materials in course of retrograde metamorphosis, that are of no use as nutritive agents."

healthy states of the stomach and system, the whole of the constituents of animal flesh as combined in nature, are in the stomach brought into a more or less perfect state of solution before they are suited to undergo the second part of the digestive process in the duodenum, and become fitted for being conveyed into and mixing with the circulating blood.

In a state of perfect health, without any hereditary or acquired weakness, with due and wholesome exercise and regimen, including well-regulated appetites, animal food in its natural state is the most nutritious, and best adapted to the maintenance of health and strength. But in by far the larger majority of mankind, some defect or debility, from within or from without, sooner or later affects the stomach and the digestive process. Indeed, the very common initiatory symptoms of disordered health are those arising from indigestion, the stomach being of all the organs that which is brought most directly into contact with the greatest variety of substances, beneficial or hurtful, in every degree.

We need not spend a word in describing dyspepsia, or in detailing its multiform symptoms;

happy is the man who does not know them well by his own experience; but every professional man becomes familiar with them from his first entrance on medical studies, and, however long his career, they must daily be under his notice and observation to its close.

Nor is it necessary to discuss the pathological theories respecting the states of the stomach, in which dyspepsia is the prominent basis of the symptoms of its disorders. It is however quite pertinent to our object to remark, that a long continuance of indigestion produces debility of the whole system and every individual organ not only predisposing to disease but actually originating diseases, change of structure, loss of, or imperfectly performed functions, and is really at the bottom of half the diseases included in our nosologies. Debility, or a low condition of the general vigour, is admitted by all to be a predisposing cause of most diseases, and especially as they are now witnessed. We readily understand that if a due supply of the proper constituents are not provided by the stomach, the blood becomes thin, weak, and watery, and every part depending for its energy on a supply of healthy blood is weakened.

Many writers attribute the origin of consumption to dyspepsia—while this is held to be disputable, every one admits that during its course the stomach loses its tone, and its power of transferring food is seriously diminished. This happens also in all febrile and inflammatory diseases, so that whilst idiopathic dyspepsia originates so many disorders of health, it comes on as symptomatic, or the result of almost every form of disease.

Hence from the earliest times means have been sought to relieve the stomach from the burthen of digesting the food necessary for the continuance of nutrition and sustenance.

The superiority of animal flesh has however only been recognized in more recent times—both for easy digestion and for containing most nutritive matter in proportion to its bulk; and concurrently it has been found that when the appetite for solid meats diminishes or fails altogether, it is because the stomach cannot digest it.

To present it to the stomach in a more acceptable form a variety of methods have been in use. Beef tea, broths, soups, especially the first, is the most common form of such modified animal food.

Beef tea is made by various processes, each giving a considerably different result.

From ordinary beef tea, prepared by boiling, we exclude albumen and fibrine, and obtain extractive matter, gelatine, and more or less proteine substances, according to the duration of the process of boiling. By long-continued boiling under the ordinary atmospheric pressure, lean meat will generally yield about one-twentieth part, or 5 per cent. of its weight, to the water. Thus a pint of such beef tea prepared from a pound of lean meat will, on evaporation, yield four-fifths of an ounce of solid residue.* Now the same meat will yield, when treated with cold water, one-thirtieth of its weight, or 3 per cent. of uncoagulable extractive; thus proving that one-third of the solid contents of such beef tea consists of gelatine, with some proteine substances.

Gelatine, even when combined with a considerable proportion of water, is incapable of permeating animal membranes, and is not to be regarded as a

* This was the mean amount I obtained from several experiments. Dr. Christison, says he found only a quarter of an ounce of solid residue in a pint of carefully prepared beef tea. He concludes that beef tea affords no nourishment, but acts beneficially in another manner. Miss Nightingale quotes this opinion in her popular work on Nursing.

staminal element of nutrition. Besides it readily undergoes putrefaction, being, according to the evidence of some experimentalists, the first constituent of animal structures to become putrid under a free access of air at ordinary temperatures.

We may therefore readily understand why beef tea, especially such as is prepared by long boiling, should so frequently give rise to flatulence and other disturbances of the stomach in weak states of this organ, and why its use has frequently to be discontinued in low conditions of the system, as in fevers and in general debility. It is often a source of vexation in practice to find patients refuse to continue taking beef tea when a fluid nourishment appears to be urgently needed.*

To obviate these objections to ordinary beef tea, Professor Liebig many years ago proposed to substitute for it a cold infusion of lean meat. He

* "Beef tea cannot do much towards the maintenance of the body, as it contains no albumen, which is the material blood requires for the formation of flesh. We may surmise that beef tea can indirectly and for a short time make flesh by supplying certain materials to the blood, which enables the albumen in store within it to be taken up by the tissues, so that they may temporarily for a short time be formed anew, according as they are wasting away. Supposing no food but beef tea to be taken during an attack of fever, it may be assumed the body will be nourished for a time, but when the albumen in the blood is exhausted, some of the material must be restored to it in the form of albuminous food, or an actual state of starvation must ensue."—Dr. W. Marcet.

directed lean meat to be macerated in cold water for some time, the fluid strained off by strong expression, a few drops of hydrochloric acid added, and this to be either administered without further treatment, or, warmed only to a blood heat or boiled and again strained, separating completely the coagulated albumen.

These cold infusions of meat, being destitute of gelatine, are often found very useful in practice, particularly in fever, to allay thirst and supply some small amount of nourishment. But they pass so rapidly into decomposition, and sometimes when kept in the sick room become so offensive, even in an hour or two (though possibly in such cases proper care has not been taken to follow the published instructions for making them), that their use is very limited.*

More recently Baron Liebig—whose researches into the composition of flesh, and discoveries of the constituents of the juices as distinct from the blood

* A theory has been advanced by some physiologists to the effect that the flesh of animals has simply to undergo solution, either altogether in a raw state, or as nearly as possible approaching the raw state, in order to pass into the blood and to replace the daily waste of the tissues, and that every kind of cooking, or preparing it with the aid of heat, serves to separate or to modify certain of its constituents, and to render it so far unsuitable for supplying nourishment. If this were true, there would be as little need of any artificial processes for cooking or preparing meat as for the stomach or other digestive organs. *Fluid Meat*, to be described presently, is, as the reader will perceive, a very different thing to raw meat dissolved.

contained in the blood vessels, must be familiar to our readers—proposed a new method for the ready preparation of beef tea. This consists in treating lean meat with cold water, boiling the solution which coagulates the albumen, straining the latter out and evaporating the clear solution to the consistence of a medicinal extract.

To this preparation he has given the name "Extractum Carnis," and although it contains only the extractive matters (described above) and the salts of the meat—being destitute of fibrine, albumen, and gelatine—this preparation has become of considerable mercantile importance.

In addition to what has been already said, it may be observed that the lean of beef, deprived of water and perfectly dry, has been subjected to analysis by Von Bibra; he finds it to consist of—

Fibrine, Albumen, and Gelatine—86 per cent;
Extractive and Saline Matters—14 per cent;

consequently, in the preparation of "Extractum Carnis," there is lost 86 per cent. of the total amount of solid materials of meat, and this composed of the most nutritive and valuable part of the meat employed. The wide acceptance of even this very imperfect representation of flesh nourishment furnishes abundant evidence of the

importance, nay, the necessity, for the further pursuit of the subject by scientific methods in this direction to obtain less objectionable articles of diet for both invalids and the healthy.

Baron Liebig himself is far too candid to attempt concealment of these truths. In a communication to the *Lancet* in 1865, respecting his Extractum Carnis, which was then beginning to excite attention, he says, "Were it possible to furnish the "market at a reasonable price with a preparation "of meat combining in itself the albuminous, "together with the extractive principles, such a "preparation would have to be preferred to the "Extractum Carnis, for it would contain the "nutrient constituents of Meat."

And, again, speaking of his own preparation, he says, "I have already stated that in preparing "the Extract of Meat the albuminous principles "remain in the residues, they are lost for nutrition, "and this certainly is a great disadvantage."

At the suggestion of Dr. Pavy, of Guy's Hospital, I undertook some experimental investigations to determine whether or no such a preparation were practicable, and after the expenditure of much labor and thought, and the experience of many

failures, I at length succeeded in making a complete FLUID MEAT in a condition rendering it an acceptable and very agreeable article of diet.

My *Fluid Meat* contains all the constituents of fresh meat which minister to nutrition. It is prepared in the form of a moist extract perfectly soluble in water. It possesses a full meaty flavor like that of roasted meat, and therefore is very agreeable to the taste. It may be eaten spread upon bread and butter, or biscuits, or dissolved in water as a substitute for fresh beef tea, but is far more nourishing.

Before bringing it prominently to the notice of the profession or the public, I have had it tried and tested by use, pretty extensively, in cases of dyspepsia, and invariably with great benefit for convalescents and persons of weakened stomachs; those debilitated by mental or bodily overwork or sedentary habits; and I can now confidently recommend it to the profession as a great desideratum for weakly persons, and in all cases where nourishing food is called for and where the digestive powers are impaired.

In order to enable the profession clearly to understand and justly appreciate the value of

Fluid Meat, I shall give below the process by which it is prepared, premising that it has not escaped the attention of practical physicians, who have perceived the want existing for such a means of affording nourishment to their patients when the stomach is too weak to take or digest animal food.

"I have often thought," says Dr. W. Marcet,* "that if there were a means of preparing meat so "as to enable its easy digestion by weak stomachs, "a great boon might be conferred on a very large "class of sufferers."

Accordingly Dr. Marcet proceeds to describe a process, the object of which he explains is to extend the preliminary digestion of meat one step further than is done by cooking before it is taken into the stomach, thereby relieving this organ from the task of carrying out, unassisted, the digestion of cooked meat.

Dr. Marcet's process involves the use of pepsin, carbonate of soda and hydrochloric acid, and a simple enough apparatus, and is intended to be carried out by persons not accustomed to chemical operations; consequently, I think I am warranted

* See a Pamphlet "On a New Process for Preparing Meat for Weak Stomachs."—By W. MARCET, M.D., F.R.S., &c. Churchill & Sons, 1867.

in saying, it would fail in such hands nine times out of ten; and when successful, the author candidly says—"This food contains all the constituents of beef tea and albuminous substances besides; although it only supplies a *portion* of the nourishment possessed by the meat which has been used for preparing it."

What then Dr. Marcet aimed at, I believe I may confidently say I have in my *Fluid Meat* actually accomplished, and I am sure the profession will see the propriety of having it prepared for them, as these processes can be so much better and more economically effected on a large scale and under the superintendence of skilled chemical operators than in the domestic kitchen.

My Fluid Meat, as I have already explained, contains all the constituents of lean meat, including fibrine, gelatine, and coagulable albumen; but by the process pursued these are all brought into a condition in which they are soluble in water and are not any longer coagulable on heating—in which state they have been designated *Peptones*. This change is effected, as in ordinary digestion, by means of pepsin and hydrochloric acid.

The Pepsin employed is very carefully prepared

—without addition of starch or any extraneous substance. Lean meat, finely sliced, is digested with the pepsin in water previously acidulated with hydrochloric acid at a temperature of from 96° to 100° Fah. until the whole of the fibrine of the meat has disappeared.

The liquor is then filtered, separating small portions of fat, cartilage, or other insoluble matters, and neutralized by means of carbonate of soda, and finally, carefully evaporated to the consistence required, namely, that of a soft extract.

The resulting extract represents in all its constituents the lean meat employed, but with the fibrine, albumen, and gelatine changed into their respective peptones or soluble forms. This change is effected solely by the pepsin and hydrochloric acid, or artificial gastric juice, without the evolution or absorption of any gas or the formation of any secondary products.

The peptones thus formed, although agreeing exactly in chemical composition and even in many physical properties with the substances from which they are derived, differ from them by a ready solubility in water and even in diluted alcohol. The changes thus effected coincide precisely with

those which physiologists tell us occur in the stomach in normal digestion when the food has been acted on, brought into a soluble state, and fitted to be passed through the pylorus, to be mixed with the bile and pancreatic juice in the duodenum.

It is important to observe that in this preparation the relations between the several proximate elements of the meat are not disturbed, far less is there any change in the state of the saline, or, as they are called, inorganic constituents, such as occurs when they are separated in the form of ashes by burning or otherwise totally decomposing the flesh.

But this process, whatever care may be taken, leaves the Fluid Meat with a strong bitter taste. This bitterness attaches always to meat digested with pepsin; and this, in the opinion of medical men, would wholly preclude its acceptance and adoption as an article of food. At the same time, it curiously illustrates the identity of the process in the laboratory and digestion in the living stomach.

In order to remove this bitter taste, and to obviate the objection to Fluid Meats on that

ground, I have made very many experimental researches, and at length have discovered that the purpose is completely and satisfactorily effected by the addition, in a certain part of the process, of a small proportion of fresh pancreas.

The Fluid Meat so prepared is entirely free from any bitter flavour.*

Physiologists, I apprehend, would demur to any pretensions that food, however treated out of the stomach, could be so completely digested as to require no action of the stomach or the gastric juice, but we may confidently affirm that the heavier work of the stomach is superseded by the Fluid Meat, and that food so prepared must relieve the enfeebled stomach of its main burthen, and enable it to complete the process of digestion without overtaxing its energies. It has been said that it would not be desirable to save the stomach the whole of its habitual work however much weakened, that the secretion of gastric juice is necessary to the health of the organ itself. Doubtless it is so; and it is not to be supposed the adoption of Fluid Meat wholly supersedes the

* I have deemed it proper to protect my preparation of *Fluid Meat* by making this discovery the subject of a Patent.

functions of the stomach. Besides it will almost always happen that some form of vegetable or farinaceous food will be given with it, bread, vermicelli, or the like, sufficient to satisfy and employ the stomach.

A very frequent case is where the mastication of meat is partial, or altogether impossible from loss of, or defect in the teeth, or diseases of the mouth. In such cases the Fluid Meat will be a great resource.

The following are methods of using Fluid Meat:—

One ounce by weight, or a large table-spoonful, equals the quantity of extract, obtained by boiling, from twenty ounces of meat.

It possesses a full meaty flavour.

Spread between bread and butter, and sprinkled with salt, it makes an agreeable sandwich.

Dissolved in water with a little salt and pepper it forms a liquid similar in taste to beef tea.

A small dessert-spoonful of the Fluid Meat in half a pint of water, or a tea-spoonful to a large tea-cupful is a good proportion, and this may be increased as desirable.

Flavoured with suitable condiments, Fluid Meat may be taken as soup, and, compared with the amount of solid matter obtained from meat by stewing, it becomes an economical article of diet.

FOR GRAVY SOUP.—Take a little carrot, turnip, onion, and celery, with a clove, small piece of mace and pepper; boil gently, strain, and for each half-pint of liquor add a table-spoonful of Fluid Meat, with a little salt.

FOR VERMICELLI SOUP.—Place in a covered jar in the oven a little sliced celery, onion, bruised spices and pepper, with water; when the celery and onion are thoroughly softened, strain, add (in the proportion of a table-spoonful to half a pint) Fluid Meat, with salt, a small knob of loaf sugar, and vermicelli, previously boiled.

ANOTHER SOUP.—Take two onions, a large carrot and turnip, cut into small slices, and fry them well with a little butter in a clean pan; when well browned, pour on three pints of boiling water; let stand till cold, scum, strain out the vegetables, add half a pound of girasole root, previously boiled in water till soft, and two ounces of the Fluid Meat; boil for a minute or two; macaroni or vermicelli, softened by boiling, may be added at pleasure.

140, *Leadenhall Street, London.*

TWO LECTURES

ON THE LAWS OF PUBLIC HEALTH,

AS APPLIED TO THE OPINIONS OF THE PEOPLE OF INDIA.

In all the countries with which we are well acquainted, and in all modern times it is found that the natural term of human existence is seventy or eighty years. That is to say, there are not known any people among whom the lives of a very large proportion of the community are protracted beyond the latter period: nor is there any land so unfortunate as not to contain some individuals who advance thus far in senility. Our scriptures fix the term of human existence at three score and ten or four score years; the Hindu shastras, in like manner, state fifty years as the term of a short life, and seventy years as that of a moderately protracted one.*

All medical observation demonstrates, and the opinions of most nations maintain that disease is not an evil absolutely and unavoidably inherent to the constitution of man; and that death itself was ordained as a punishment for sin, but was not originally the inevitable result to which existence tended. The Christian scriptures hold that "the wages of sin is death;" and physicians and divines have investigated and illustrated the doctrine as the basis of an established fact. "Nothing but man," says Watts, "was created without any principle of decay or death in him." The great philosopher Boerhaave maintained, with truth, that the only malady inherent to the human frame is the decay of old age. There is perhaps even more precise accuracy conveyed in a proverb, popular among the Welsh, that "Death is the ripeness of age;"—the natural dissolution of the extremely aged being a mere tranquil and painless passing away from existence, dependent mainly upon the gradual suspension of the processes of nutrition. We are told that, among the negroes of Loango, death is believed to be unnatural.† That very interesting peo-

* See Hindu System of Medicine, p. 22.

† Southey's Common Place Book, fourth series, page 544. According to Stewart and Ellis, the people of the Sandwich Islands also believe that men do not die by the course of nature, but either by poison, sorcery, or the immediate power of some unpropitious deity. Southey observes that, among savages, there is something approaching to a common consent in the opinion, that man could not have been intended to be mortal when created.

ple, the Khonds, inhabiting the hill tracts of Orissa, maintain that death is not the necessary and appointed lot of man; but that it may be incurred, either as a special penalty for offences against the gods, by their appointment, or by magical agency purely human.* The Hindus regard all disease as the penalty of crime committed in a previous state of existence.

A conviction, formed upon the results of daily experience, that the Providence which guards us all has permitted mankind to exercise, to a certain extent, their reason and forethought in maintaining the natural term of their own existence and in mitigating the severity of the diseases which abridge and embitter life, has led men of all races, in all periods of the world, and in every stage of civilization, from the rudest to the most cultivated, to rely with strong hope and confidence upon the art of healing. I need scarcely say that, in this country, a comprehensive system of medicine has been handed down from the remotest periods as an essential portion of the Hindu religion; and that, for nearly seven hundred years, the Hukeems of the Mahomedans, reputed as the blindest of all fatalists, have been actively engaged in practising their art throughout the length and breadth of India. In nearly all periods lawgivers and physicians have perceived and have striven to enforce the fact, which must always stand first in all systems of medicine, that disease may be avoided by the exercise of care and forethought among communities and individuals. It will presently be shewn that both the Mahomedans and the Hindus have, embodied in their religious practices, highly important systems for the prevention of disease; and the physicians and legislators of Europe have, in far later times, recognised the vital necessity of forming and establishing similar laws of health; and their investigations have, almost within the last twenty years, enabled them to lay down a sanitary system, for the preservation of the health of communities, so comprehensive and definite, as to give promise of taking a place, which curative medicine can never be brought to occupy, among those sciences which, in our fallible reasoning, we venture to term Exact. In advocating a system of this kind, which in its fullest and most successful working would absolutely extinguish many of those diseases which they live by healing, physicians deserve to receive that attention and that confidence in the honesty of their intentions which would be due to the English farmer who should uphold the advantages of free trade or to the Brahmin who should

* Captain Macpherson.

exert himself in removing the barriers of caste. It is needless to insist upon the fact that men are not disposed to admit, much less to propagate, facts tending to shake the meanest of their own interests, except upon a thorough conviction of their paramount importance and unassailable truth. It is unnecessary, in the present state of the question, or before this audience, to array any lengthened series of statistical data, in proof of the facts, that, throughout the globe, the average duration of human existence scarcely exceeds one third of the allotted period of seventy years; and that,—even apart from the operation of war, famine, or pestilence,—there are, in nearly every known country, certain classes of unfortunates whose average term of life barely reaches a third of the brief span to which the years of the rest of the community are extended. For example, in England, reputed one of the healthiest countries in the world, the average expectation of human life is—not seventy—but forty one years. In that country it is found that, while under the natural dispensation, the annual proportion of deaths should not much exceed 7 in the thousand, the healthiest known district loses 14 in the thousand: while the mortality in the unhealthiest city is upwards of 35 in every thousand. Nay, there was, not long since, a spot in London itself, where the average period of human existence was narrowed into a span of ten brief years. In this manner, we are told, there perish, *unnecessarily*, every year in England and Wales nearly one hundred and eighty thousand persons, whose lives could have been saved by sanitary measures with the same certainty which attends the prevention of ague by drainage and of small pox by vaccination.*

The enquiry which lies before us this evening has regard to the extra sickness and mortality which arise in India from preventible causes, and to the means by which this fearful amount of suffering and death may, under the sanction of Providence, be mitigated and abridged by the exercise of common sense and of common science. I shall make no apology for bringing this question under the consideration of an educated audience not consisting of medical men. Every person endowed with that amount of intellect and foresight which will prompt him to flee at the approach of an advancing whirlwind, to seize a weapon as an armed foe attacks him, to provide himself with warm garments as the season of heat draws to a close, or to cry for the aid of a physician when he feels that the grasp of disease is laid upon him, may be expected to exercise at least a similar

* Eclectic Review, October 1853, p. 398.

amount of care and forethought in guarding his life against the self evident causes of pestilential visitation, and of slow constitutional decay which environ every inhabitant of this beautiful but ill-tended land; and every person possessing the higher gifts of intellect, with power and wealth to back them, is morally bound to exercise those gifts in defending his less wise and poorer fellow creatures against the impending destruction of which they are unconscious, or before the sway of which they are, of themselves, incapable of retreating. The ratios of deaths among the principal classes of persons inhabiting India have been calculated as follow.—It must here be borne in mind that the rate of annual mortality, in the unhealthiest English city, among all classes, including of course infants and aged persons, is about 35 in the thousand per annum.—The annual mortality among the European troops in this presidency, that is, among picked men in the prime of life, is only a few fractions short of 74 in the thousand. It has been calculated that "the British soldier who now serves one year in Bengal, encounters as much risk of life as in three such battles as Waterloo." It was lately put forward, as a fact of great interest and encouragement, that the annual mortality among the Bengal Civilians, between the ages of 21 and 45 years, viz. 17.830 in the 1000, was only a little higher than that among the aggregate male population of the same ages (consisting of starving emigrants, paupers, hospital patients, labourers, mechanics, and a sprinkling of merchants and professional men) in Liverpool, the unhealthiest city in England; and was less, in the proportion of one in every 780, than that among men at the same ages in Glasgow which,—with its smoke, its spirit shops, its never dying typhus fever, its baleful manufactories and its overcrowding,—stands forth as the most pestilential city in the United Kingdom.

With regard to the mortality among natives of this country, we find that the deaths among sepahis serving in the three presidencies of India, during twenty years, has been 17.251 in the thousand. For the sake of comparison, it may be mentioned that the mortality of English troops, upon home service, is about 14 in the thousand.

In the year 1852, the average of deaths among the prisoners in the jails of this presidency was 37.610 in the thousand. This nearly equals the rate of mortality (38.938) in the Hulks—the most unhealthy of English prisons.

In the absence of accurate census returns, and of an absolutely correct system of mortuary registration, there exists considerable doubt with regard to the rates of mortality prevailing among the general native

population of India. The most reliable tables are probably those kept in Bombay, which shew that, during the year 1852, the mortality in that Island was about 25 in the thousand, a rate which evidences serious unhealthiness among the community. Dr. Strong's tables shew an average mortality of 51.10 in the thousand among the native inhabitants of Calcutta during a period of 16 years.

Dr. Stewart found that the mortality among the native community in Calcutta, during the year 1849, amounted to about 35 in the thousand, which nearly corresponds with that prevailing in Liverpool, England's unhealthiest city.

It is worthy of remark that Mr. Bedford's calculation of the rate of mortality at Chittagong as nearly as possible corresponds with that prevailing in Bombay.

In 1852 Mr. Bedford drew up another and still more elaborate series of mortality tables for Rampore Bauliah, a place containing about 28,000 inhabitants. His results, deduced with extreme accuracy, shew that, during the year in question, (not, I believe, one of any pestilential visitation whatever) the deaths there amounted to rather more than 40 in the thousand. Recently, the mortality in Delhi was rather above 34 in the thousand. These are indeed remarkably coincidental and striking figures, shewing merely (after allowing for unavoidable errors) that varying range of mortality which we find occurring in the various towns of England and of Europe generally. We must not, as I have already hinted, take these rates as absolutely certain; still, they sufficiently establish the facts that the mortality among the native population of India is unnaturally high, and that sanitary measures should be adopted for its diminution.

Before proceeding to enquire into the means by which it is probable that the excessive mortality prevailing among the civil population of Bengal may be materially reduced, it is necessary to glance at those physical conditions of the region in which we stand, which manifestly tend to the development and spread of pestilences and other destructive diseases among its inhabitants.

It was, long ago, observed by a great author,* that—"The labour and operations of man not only improve and embellish the earth, but render it more wholesome and friendly to life. When any region is neglected and destitute of cultivation, the air stagnates in the woods, putrid exhalations arise from the water: the surface of the earth, loaded with

* Robertson.

rank vegetation, feels not the purifying influence of the sun or of the wind, the malignity of the distempers natural to the climate increases and new maladies no less noxious are engendered."—Such were the sound doctrines held by an Edinburgh professor of the last century, when sanitary matters, although not ill understood, were comparatively little attended to. They enunciate the experience of all times. The advances of the colonist in a new land meet with infinitely less opposition from its climate,—the extreme and unwonted severity of its heat or cold,—than from the utterly wild or wholly ill-cultivated condition of its surface. It is not merely that he sees before him the danger and the toil of driving forth the wild beasts and savage tribes who menace him in all directions, and of changing forests and wastes into cornfields and pastures. The temperature of the air and the nature of the soil must be subdued and adapted to the purposes of his existence. This law in nature was, doubtless, recognised by that little band of Albans who, gazing around those seven green hills which they had named Rome, viewed the dreary waste of the Campagna with its heavy mists and stygian waters hemming them in on every side;—by Cæsar, when,—having mustered his legionaries within the belt of marshes guarding a little island stronghold whence a tribe of Gallic fishermen had fled, panic-stricken before his irresistible power,—he commanded that here should be laid the foundation of a royal city which should be known hereafter as Lutetia Parisiorum—Paris;—by Agricola, as his glance swept down from the camp of Galgacus on the Grampians over the wild and desolate tract of rocks and marshes surrounding insignificant spots of blighted harvest land—his barren spoils—where the wolves yelled around the smoking ruins of the Britons' huts. Such too were the first fruits of practical discovery gathered by the Castilians on the Spanish Main. Such has been the daily experience of every European who has perilled health for wealth in India since Job Charnock;—driven to seek a refuge from the pestilential swamp vapors of Ooloobeeréea, attracted by the fresh luxuriance of a spot where the pleasant green of rice fields spread to the horizon, unbroken save by the outlines of a few tauntees' (or weavers') huts, refreshed after his weary travel by the beauty and the shade of the glorious peepul tree which, two centuries ago, waved its branches at the Baitakanah,—hard by the spot where we stand now, under a Grecian canopy and in the light of modern science,—and secure in the barrier which the strong river to the west afforded him against the incursion of his foes, the Marhattas—unmindful

of a far worse foe, the mists of death which ever arise from unreclaimed lands;—chose, in evil hour, the low, close and radically unhealthy spot of Kalí Ghat, as the perilous seat of the mightiest colonial empire that the world has ever seen.

The observer of nature perceives that there are various modes and degrees in which the physical disadvantages of newly occupied countries render them unfitted to the health of their colonists. Thus, no poisonous vapours arise from the stony crags of the breezy mountain fastness,—and here the soldier determines to place his stronghold. But the succession of four seasons fully shews him that the land and the air have not been subdued to his will:—water must be conducted, with infinite labour, from higher spots, by cuttings, and tubes, and aqueducts into reservoirs within his fort; trees must be planted to give him shade and to attract the soft vapours of the lower clouds to his dry and scanty gardens upon the platforms and in the crevices of the rocks, for there corn and pasture land are denied to him. Walls of impenetrable masonry can alone stand, at that altitude, against the violence of the storm, and protect him against the winter's cold. And so, in the close unventilated chambers of their rocky holds the wives of the Norman Barons of old pined and died of consumption and puerperal fever; and, in the present day, the tribes which inhabit the lower ridges of the Himalayan range are swept away, village by village, before the outbreaks of small pox and Mahamurree—the great death, the true plague. Hence, in the course of generations, it usually happens that the natural disadvantages of hill districts drive their inhabitants down, either as robbers or as mercenaries, among the people of the unhealthier, but more fruitful plains. In these lower grounds, again, we hear of spots, like the greater Terai of the Himalayas, in which no human life can endure for a single year; and into which, at certain seasons, it is almost inevitable death to advance a foot. Such, probably, was the pestilential north coast of Montezuma's empire into which Herrera tells us that tyrant used, from time to time, to despatch eight thousand families of settlers, sending other similar supplies as soon as those were poisoned off. Another and somewhat lower degree of permanent ill adaptation of a country to the human constitution is distinctly marked by its unfitness to support the lower animal creation. Thus we learn that, in the present day, Portobello, on the Atlantic, to the north of the Isthmus of Panama,—a noble harbour, under whose deceitful waters, in the deep shadows of the magnificent forest trees which tower upon their very

brink, the bones of our gallant Hosier and of the flower of his twenty sail of war ships gather sea-weed—"has long been a pestiferous ruin, inhabited only by negroes and mulattoes, and one or two individuals of Spanish descent whom cupidity tempts to reside there. It is built close to the sea, at the foot of high mountains, covered with thick impenetrable woods, the soil is drenched with heavy rains and hidden by a superincumbent load of decaying vegetation, from which the rays of the sun send up a miasmatic vapour which covers Portobello as with a funeral pall. The 'Sepulchre of Europeans' is its local and appropriate name. *Even the inferior animals deteriorate and wither there so fatally, that meat for the support of the scanty inhabitants has to be brought, with great difficulty and at considerable cost, from Panama.*" Those who are at the trouble of tracing out the course of pestilential visitations, will generally find that these scourges, when hurled upon man in their greatest intensity, have generally fallen first upon the lower animals, in the form of murrain,—an important fact, which I would beg you to keep in mind as bearing strongly upon certain other facts which I shall have, presently, to lay before you in speaking of the climate of Bengal, the next subject for our consideration.

It would be difficult for one who had never seen Bengal to find any mode of accounting for the apparent total irreconcilability of many of the older accounts respecting it. To any observant person, however, who has passed even a single month in its interior, the explanation becomes a mere plain statement of matter of fact. We find many early travellers, like the philosophic Bernier, describing Bengalla as—"the best and fruitfulest part of the world;" "a country abounding in all things;" a kingdom into which, on account of its many attractions, "there are an hundred open gates to enter, and not one to come away again." This latter eulogium is, however, adapted in a sense more literal than complimentary in a translation from the Persian (of much older date than the previous quotation) cited by Mr. Martin. Here we are told that—"In former reigns (of the Mussulmaun Sovereigns) the climate of Bengal, on account of the inclemency of the air and water, was deemed inimical to the constitution of Moghuls and other foreigners, and only those officers who laboured under the royal displeasure were stationed there; and this fertile soil, which enjoys a perpetual spring, was considered as a strong prison, as the land of spectres, the seat of disease, and the mansion of death." Nearly

equally poised between these two extremes do we find Bengal of the present time. A brief review of its climatic state may not ill repay your attention. Traversed, from north to south, by the most impetuous and most uncertain river in the world, Bengal Proper, or the true delta of the Ganges, is a mere alluvion; deposited, as it would seem, in a vast estuary into which this monarch of hill streams once rolled forth his earth laden waters. The term "uncertain," as applicable most especially to the Ganges, will be best understood after a perusal of Major Colebrook's interesting paper, published in the 7th vol. of the Asiatic Researches, on the frequent alterations in the course of this river through Bengal; where it is shewn that, within a comparatively brief period, the stream has, as it were, wandered out of one course into another throughout an extensive tract of country, nearly every part of which has, in consequence, been left virtually in the condition of newly deposited land. So vast and so changeful a stream,—depositing, in the course of ages, a succession of mud-banks which daily receive new material, from the first green plat which we may conceive to have appeared above the waves of the old estuary, until the period at which we may not unreasonably believe that, its lower channels having been silted up and its beds having become raised by the deposits of centuries, it shall burst down through Southern India in some other course,—such a river, I repeat, is evidently calculated to bring far more fertilization than salubrity to the country which it traverses. Floods, and their natural consequences heavy rains leave this absolutely flat and rivulet-broken soil in a condition of oosy moisture and loaded with the rankest and most profuse deciduous vegetation imaginable throughout the damp season; while, during that long season in which scarcely one drop of rain falls, the thin layer of loam which covers the vast sand bank of which the country is composed becomes perfectly destitute of moisture, when all the feeble vegetable growths wither to form the pabulum of next year's crop. Throughout the whole of the year thus occupied, there glares down upon this plain the almost vertical blaze of an inter-tropical sun, drawing, nearly at all times, from all the myriad acres of exposed water margin, and cracking or steaming earth, watery fumes laden with those corruptions of vegetable and animal matters which are known to physicians as miasmata, and to nearly all other men as the essential causative principles of Cholera, Fevers, and Dysentries. In such a country as this it appears probable that agriculture may be carried to nearly its highest perfection;

and here, even apart from the interference of man, the streams, the fields and the trees present features of surpassing loveliness; but, even under the most favorable circumstances, a land so constituted can scarcely ever be expected to reach a very high point of salubrity; while, if generally neglected or ill-managed by its denizens, it is physically impossible that it should be otherwise than a hot-bed of pestilence capable of contaminating the rest of the globe. This expression is by no means too strong. It will be remembered that it was from the only other spot of similar extent and physical constitution that could be pointed out, the great alluvial country of China, lying between the Hoang-Ho and Yang-Tse-Kiang rivers, from which burst that Black Death of the fourteenth century, which swept away three-fifths of the inhabitants of Europe; and that it was from the inundated rice fields of Jessore that arose, in 1817, as an epidemic, the plague of Cholera which is now manifestly gathering fresh energy for the destruction of the third fifty thousand lives which it has claimed in England during the last twenty two years.

Beyond this, it must be remembered that Bengal is, in more than one sense, a fallen country. Scarce one hundred years of English occupation,—and it may be said without any fear of denial, of honest interest, on our part, in the well-being of the natives,—have not sufficed to remove from Bengal the traces of that blight which Musulmaun power has, in all ages, cast over every one of those spots in which it has long reigned paramount. We found the country literally ground and crushed beneath the iron heel and within the grasping clutch of the oppressor; and ages must still elapse before we, strangers to the country and to the feelings and sympathies of the people, can, with the best intentions most energetically carried out, eradicate all the evils which our predecessors fixed so deeply; remove that distrust which they maintained undying by the cruelties of six centuries; and enlarge and exalt the moral tone which they, in every one of those six hundred years strove earnestly, by example and by force, to narrow and degrade. These reflections are by no means beyond the sphere of the Physician and the Sanitary Reformer, who are quite unable to conceive the existence of a high standard of health among those whose minds are enfeebled and demoralised. It is also absolutely necessary that all such drawbacks should be fully taken into account in the consideration of all enlarged measures of sanitary reform; since no defeat can be more disgraceful and injurious than that of the practical philosopher who, upon

the groundwork of a few narrow data, promises to achieve that which the united wisdom of all the ages of this earth may never prove valid in effecting.

Before we proceed to enquire into the particular measures by which we may fairly hope to improve the physical condition of the people of India, it will be right to pause, for a brief period, to convince ourselves that similar undertakings have been carried out, with fair and sufficiently encouraging success, elsewhere.

Our best and safest example may be taken from England where the experiment has been practically working, although with very tardy development, during every one of the last eighteen hundred years. I must particularly beg your attention to the following brief historical statement, as it will be found to bear very strongly upon our immediate object. We may, by the devotion of a little research, draw out many lines of strong resemblance, not only between the manners and habits of ancient England and those of Bengal, but also between the physical conditions of the two countries—and this to an extent far beyond that which is covered by the self evident principle that any two minds of equal education or any two countries of equal cultivation will, in certain respects, resemble each other. I have no occasion to dwell long upon that pre-historic period during which it has now been clearly proved that the wilds of Britain and Hibernia were overrun by races of creatures closely akin to those which are now rapidly dying out from our Indian jungles "Tigers," says a modern Geologist, "as large again as the biggest Asiatic species lurked in the ancient thickets; elephants of nearly twice the bulk of the largest individuals that now exist in Africa and Ceylon roamed in herds; at least two species of rhinoceros forced their way through the primaval forest; and the lakes and rivers were tenanted by hippopotami as bulky and with as great tusks as those of Africa." These were the creatures whose relics now excite our wonder in what Geologists term the tertiary period. There came, however,—probably immediately after the period of these fossilized creatures,—a time, closely verging upon that which is historical, in which such animals lived surrounded by the men of the Northern countries of Europe. This is proved by the frequent discovery of their gigantic bones, well preserved, but not fossilized; the huge tusks, with their ivory still pliant to the turner's chisel, lying in perfect ruines on the banks of rivers and on wild sea shores—nay even the vast bodies hanging, fully preserved in hair and flesh and muscle, on the slopes of ice-bergs to fall thence ultimately and to be devoured by bears and

wolves; the gigantic antlers sunken in peat moss; the great ribs standing forth in the beds of rivers like the frames of stranded ships. We come to more practical guidance, however, when we approach the period of the first Roman Invasion of Britain, nineteen hundred and nineteen years ago, and view the country as the Cohorts began to view it as their triremes swept them towards that very spot on the Kentish coast where, two years since, England's greatest warrior died a sentinel on guard. We learn that the population was, even then, considerable; that the people of the sea coasts, who were principally settlers, lived mainly by plunder and upon the fish produced in the great estuaries which then extended far up into the country. The people of the interior, regarded by Cæsar as the aborigines, held themselves apart from these, maintaining their hill-fortresses and their forest clearings with unapproachable rigour. These latter people were rich in cattle; and, here and there, on hill slopes and in open glades, they held small spots of arable and pasture land; but, generally, the country was either overrun by vast forests or broken by lakes, morasses, and swamps. There cannot be a doubt that the over-vegetated state of its surface rendered Britain, in those times, not only damper and less healthy than it is at present, but also very considerably warmer. Consequently, its natives were satisfied merely to cover their painted bodies very partially with the skins of animals slain in the chase. These were certainly the wolf, the wild cat, the swine and the wild ox; to these we may probably add the hyena and a few other species now extinct; and,—as I am very much inclined to believe, although the opinion may provoke derision,—a huge crocodilian reptile, of a type even then rare and now unknown, lurking in the almost inaccessible fens, levying contributions from all the surrounding country. The slaughter of one of these gained for the doughty champion who achieved it national and, latterly, saintly honors. It will be seen that I allude to the Dragon, whose existence is believed to depend only upon the fancies of monks and heralds, but which may have been as real as that of the Epyornis of Madagascar and the bird Dodo, or of the Bustard, which is at present ceasing to exist in England. Thus far, except in the absence of the torrid sun-glare above them, the condition of England's plains and estuary and river margins was not very dissimilar to that of Bengal in the present day. The diseases of the two countries were equally similar. Fluxes and Agues were then the chief scourges of Britain.

View the country one hundred and seventy years later, and you will

find the Roman power firmly established there, and actively exercising that stern but wise and humane tyranny which Rome ever turned to the improvement of captured states. We now find the Maritime Britons held in tolerable check, the stubborn people of the interior drawn from their tree-fastnesses and hill-strongholds and commanded to carry their corn about, and into the most distant countries—but along magnificent roads constructed under the supervision of these wonderful road makers and wall builders who had gained the mastery over them. We see them, not without stripes and indignities, clearing those woods and paving, those fens which Agricola had found such formidable barriers to the advance of his army; but this swamp-draining was a work which scarce any but Roman enterprise could dare to enter upon,—seeing that, as Herodian tells us, all Britain was marshy, even up to the time of Severus. We find them also, still under compulsion, reclaiming the estuaries by those extraordinary embankments of which the Kent and Essex walls are examples—which remain scarcely injured now; but which, if once broken through, have been found insusceptible of repair even by the great engineers of the present day.

We now pass over the long period of twelve hundred years, and may imagine ourselves as taking our stand on Fairlight Down, in Sussex, or on Shorne Hill, in Kent, towards the close of the fifteenth century. What a prospect of improvement, what an advance in civilization is here mapped out before us! The land has been long cleared of forests; there are only enough trees to furnish house and ship timbers, fuel and stout yew boughs; every spare acre of really good low ground is either a pasture, a garden or a harvest field. Wherever the grass grows freshest and the rivulets sparkle most, there rises out of the verdure the belfry of an abbey or a chantry; there are royal strongholds, and the towers of feudal castles on whose breezy summits stand—not half naked woad stained barbarians—but soldiers in steel hawberks and gentlemen in silk and furs. These are the favorable points in the picture, but it has also its darker traits. The marshes are immeasurably more extensive than all the fields and gardens and chases and pleasaunces put together. The religious houses stand too low, and too many fish ponds lie in their vicinity. The earl who lives in yonder magnificent castle does not understand that he might as well be drowned at once in his moat as undergo slow poisoning by its weedy exhalations; he, moreover, sleeps every night in a turret chamber ten feet square, where he breathes only through an arrow slit in a wall eight feet

thick into which he thrusts, effectually, his most available garment whenever the weather-cock veers eastward. The town which crowns yonder eminence, with its picturesque gables and glittering vanes, and its Gothic Church, choke full of engraved brasses, and alabaster tombs, and ill savours which incense can hardly disguise, seems jammed far to closely within the circle of its battlemented wall;—it appears as if it would look fresher and breathe more freely if it could break through, and spread down the hill and stretch far away into the meadows beyond. It is a busy place:—last year, its inhabitants numbered six thousand; now, they are barely four,—the rest died of the plague. They had to send for the Bishop to consecrate a new burial ground for them *within* the walls. But no other such mortality has been known there for the last seven years,—although, some how or other, the plague does break out every year and kill off a few. No one can tell how it travels there (they never dream that it is home-made)—except that, last year, the mayor got a new doublet from London and died the next day, thus taking precedence of the other two thousand and odd knaves and craftsmen. The peasants who are trooping yonder look, for the most part, neither happy nor healthy; there are many pallid faces among them and many hands pressed against sides as they toil up the ascent. They are people of the low country, and all have either dysentery or ague cake, or are "liver grown," they are bound for yonder little chapel where the priest, whom they call Sir John a Shorne, undertakes to cure them by a liberal use of holy water and grey spiders, and by certain miraculous feats with a sacred pair of boots. Yonder green lane is the *Plague Road*. It reaches to some place beyond York, without ever coming near a town or hamlet. Upon it suspected persons may travel without danger, and the stout thieves who infest the public ways do not affect it. Yonder hollow stone is not a curiosity—it is only the plague stone which, when the pestilence is at its height, is safe and convenient in concluding bargains,—you place your money in the vinegar within the hollow and retire, your creditor then advances fearlessly and takes the coin out. I have been at considerable pains to discover what were the prevailing kinds of disease at these periods; and find that, apart from Plague, the Black Death, and Sweating Sickness, they were still Fevers and Fluxes, the results of marsh poison and of town closeness and filth. It is very remarkable that a large collection which I have made of the circumstances attending the illnesses and deaths of royal and noble personages in England, from the conquest

until the commencement of the last century, demonstrates that, within that period, THE DISEASES UNDER WHICH OUR KINGS AND EARLS SANK WERE ALMOST INVARIABLY IDENTICAL WITH THOSE WHICH NOW DESTROY THE CONVICTS IN OUR INDIAN JAILS. A scruple of Gallic acid well administered to Harry of Monmouth might have averted the wars of the Roses; and a drachm of Quinine properly employed upon the constitution of Mary, surnamed the Bloody, might probably have so far tended to sweeten her temper as to moderate the burnings at Smithfield and thus have left dormant, until this hour, that spirit of resistance which effected the Reformation in England.

Still again, let us place ourselves (as we can, alas, only in imagination!) upon some elevated spot in London, and unrol, mentally, the chain of sanitary improvements which have been effected in England from the epoch at which we just now paused,—the reign of Edward the Fourth,—up to the present time. It must not be forgotten that the time of plague roads and haunted marshes of which we have just spoken gave birth,—in the Printing Press,—to the greatest promotion of *Sanitary Measures*, as well as of every other improvement attendant upon advancing enlightenment ever achieved by man without the declared aid of the Divine Power. This engine dispelled in all directions not only the poisonous mists which had gathered in men's brains and around their hearts, but also those which hung above the foul floors of their eating chambers and over the stagnant waters of their moats. It led learned physicians—several of whom sprung into note in England soon afterwards, such as Linacre and Kay and Bullen—to investigate the nature of pestilences and to spread the results of their enquiries among the learned of their class. The visitation of the Sweating Sickness which occurred in the reign of King Henry the Eighth,—although it mowed down the flower of England's youth and chivalry and left the nation sunk in lamentation and woe,—must be viewed, now, as a blessing to the land, inasmuch as the recollection and the terror of it prompted Erasmus and Kay, or Caius, to lay down in their writings what must now be considered as the true theory of pestilences and the fundamental principles of the science of Public Health. Printing led directly to the Reformation, the Reformation involved a change, not only of religious opinions, but of national usages and personal habits. The Elizabethan mansions, models of unarmed security, spacious and well ventilated, were adopted instead of the grim Norman keeps, which were now allowed to crumble away beside them,—battle places in future,

only for the house pigeons and the jackdaws; fitting habitations only (as indeed they were from the first) for the bat and owl. After the Reformation, society in general ceased to fast upon the choicest fish on Fridays,—and so meres, and stews, and marshes, and estuaries, and eel pits and moats which had formerly brought hard money, (and hard spleens into the bargain) to their owners, went out of the market, and so out of fashion. Towards the middle of the seventeenth century several great and beneficial draining operations were commenced, especially the draining of the Bedford Level and the reclaiming of a portion of the Lincolnshire Fens.

The Plague,—which, for centuries, appears never to have been out of London, and which, every few years, destroyed in that city from four to thirty or forty thousand souls,—at length, in the memorable years 1665-66, swept away no less than 70,594, out of a population of certainly not more than half a million; a mortality which exceeded, nearly by one third, the destruction wrought by the Cholera of 1848-9 among the sixteen millions inhabiting England and Wales. In the following year, the city of London Proper was burned to the ground; and, upon its being rebuilt, the close and tortuous lanes in which poisonous exhalations had gathered and concentrated for centuries were replaced by direct and airy ways. The underground drainage of the city was much improved; the old ill-ventilated wooden houses were replaced by shops and dwellings built upon plans suggested by two of England's greatest architects—Inigo Jones and Christopher Wren; and the manifest and direct results of these improvements,—inadequate as they were to all the fullest purposes of public health,—was that the Plague died out of London, and of England too, until the last case was registered in 1679. Now here is one of the most clear and demonstrative of a host of self evident proofs of the power of a well directed sanitary system in controlling and even in removing pestilential disease. Let us do our best, as sensible men and good citizens inhabiting a country in which there exists more than one plague more grievous far than the Plague of London, to act energetically upon the guiding of these facts. But it may be said,—this Englishman, in looking mentally over the beautiful streets of this improved London of his, and over those reclaimed fields of that England of his which he considers so healthful, has allowed his exultation to blind him to the fact that, at this very moment, there is slowly but manifestly

gaining energy in England a pestilence,—the Cholera,—which, unless the direct mercy of Divine Providence should avert it, will, in all human probability, whatever he and others much wiser and more powerful than he is can say or do, sweep off at least fifty thousand of the population of that country before the close of the year 1856.

The answer is, in all humility and in no small grief—true—perfectly true. But it must be held in mind that the Sanitary System in England, although well understood, works tardily, and that the Sanitary Reformers of England are few, albeit they include the government. The Sanitary Reformers can only advise and direct, and must be satisfied if, as years roll on, they find that a portion of their counsel has been practically acted upon. While the general body of Englishmen affect rail-roads and turtle-feasts more than sewers and blue books on Public Hygiene, the Sanitary Reformers must rest satisfied that they can no more force them to expend their money upon improvements of really vital magnitude than they could compel them to cease to elect their own members of parliament or to begin to wash their greasy faces. There is, however, a Power above us all who directs these matters at His own good pleasure and at His own appointed time. The reason which He has implanted in us, teaching us that these facts are true, and great, and good, we impart them to you and conjure you to meditate over and finally to act upon them,—recollecting that this same Power affords no aid to those who fail to employ their faculties—His gifts—in assisting themselves.

I trust that, with your own previous knowledge of the subject, these few remarks will do somewhat towards convincing you that the aid of a Sanitary System is needed, and may be adopted with a fair prospect of benefit in India.

I shall now solicit your attention. while I endeavour to trace out the leading desiderata in a system of Public Hygiene, as applicable to the necessities and to the opinions of the inhabitants of this great country. A deliberate consideration and discussion of this subject appears to be especially called for at the present time, since it has recently been stated in the public prints (whether upon good authority or not I am not aware) that it is in contemplation by Government to extend the benefits of a Municipal Act throughout the whole of the towns and villages of this Presidency. It has always appeared to me to be

essential to the success of a thoroughly organized system of Public Hygiene in India that the provisions of the measure should be calculated to meet, without in any way opposing or offending the national opinions and prejudices of the Hindu and the Mussalmaun races.

Those to whom the duty of thoroughly reforming the characters of subject nations has fallen, have always found two great courses of policy open to them.—First, that of so thoroughly putting down and stamping out all traces of ancient nationality, all class distinctions, all observances of religion, of language, of laws, of games, of ceremonies and of dress, that the absolutely subdued and denationalized people should be ready to receive abjectly any form of institutions which their victors might be disposed to thrust upon them. A radical system of this kind might answer well enough in the earlier stages of the march of civilization, in the hands of a Roman despot.—It can only be viewed with abhorrence by the humane spirit of the present day. No Christian power would degrade themselves by attempting it; no horde of barbarians could be found so utterly brutalized as to require it, or so wretchedly degraded as to become subject to it.

The other, and wiser, and more humane plan has been, gradually, and by the force of reason and of example, to disabuse the subjects of our teaching of those errors which evidently militate against their spiritual and physical well-being;—and that without in any way attempting to intermeddle with those of their customs which, upon close investigation, are found to be either useful or harmless.* For, in adopting this course, it is remembered that the customs and institutions of any nation,—founded as they usually are upon the experience, and generally upon the wisdom of ages,—cannot, with safety, be shaken by a rash or inexperienced hand. Every nation, not excepting my own, presents a wide field for the extension of civilization: but no people, even one grade above the meanest savages, can have continued to inhabit a country for many generations without adopting a large proportion of those customs which the requirements of every day life have shewn to be most suitable to their condition. Further, it has been borne in mind that, to deprive a people of

* "A King who knows the revealed law, must enquire into the particular laws of classes, the laws or usages of districts, the customs of traders, and the rules of certain families, and establish their peculiar laws, *if they be not repugnant to the Law of God.*" Menu c. VIII. 41.

their national character is to degrade them utterly, by destroying their self-esteem and their self-reliance. Therefore, anxious as all humane and reflective men are to remove that ignorance, superstition, stolid prejudice, and irreligion which prevail equally,—I repeat it, *equally*,—in England and in India, the ultimate result which these philanthropists desire to effect is, to leave the subjects of their civilization as absolutely and essentially Englishmen and Bengalees as they ever were,—but Englishmen and Bengalees into whose minds the light of Religion, Education and Humanity has shone enduringly.

In introducing, therefore, a system of Public Hygiene for the people of India, we may be in part, but in part only, guided by the expressions which were employed by Burke, nearly seventy years ago.—"We are not here to commend or to blame the institutions and prejudices of a whole race of people, radicated in them by a long succession of ages, on which no reason or argument, on which no vicissitudes of things, no mixtures of men, or foreign conquest have been able to make the smallest impression."—That is to say, we must not rashly lay the hand of innovation upon wise and time-honoured customs; we must not insist upon the abandonment of national usages, merely because we cannot fully comprehend their scope and utility; we must not even attack, incautiously or ignorantly, the superstitions of religion,—for the worship of the Deity is a subject which must ever be approached with bowed head and reverent feet,—but,—holding in view the great reforms which have been effected in India, long since the times of Burke and Hastings, especially in the abolition of Sati and Dherna, and in the check of Human Sacrifice and Female Infanticide; in the spread of the European systems of Education and of Medicine, and in the rapidly increasing disposition to improve the condition of the women of the country,—we may certainly feel assured and justified in suggesting to our native brethren a close sifting and renunciation of many of their opinions and usages which are demonstrably erroneous and injurious, as well as in exhorting them to return to the close observance of certain ordinances which were, long ago, inculcated by their own sages and law givers; but which, as ages have rolled on and national opinions have become unsettled, have, unhappily, long since fallen into neglect and desuetude.

Let it not be thought, for a moment, however, that I would wish to see the spread of enlightenment in India confined within this narrow pale. I have merely stated what is barely sufficient for the establishment of the

object which we have now under consideration. Our further steps in this great progress will, doubtless, be directed by a Power which is greater than ours.

Without possessing any deep erudition in Eastern literature, it is easy to perceive that the religious ordinances of the Mussulmauns and the Hindus embodied most important and valid systems of Public Hygiene, admirably adapted to the physical wants and to the position—as regards climate, means, and bodily constitution—of the people legislated for. The laws of the Koran, (which were borrowed nearly wholesale from the Levitical code) provide for household and personal cleanliness; for the avoidance of intoxicating liquors and of those meats which are generally unwholesome in hot climates; for the burial of the dead apart from the living,—and, indeed, prescribe most of the rules which religion inculcates to secure the physical well-being of the human race. In like manner the Vedas and Shastras of the Hindus and the Institutes of their lawgiver Menu, are replete with wise injunctions relative to ablution; the cleansing and draining of houses and towns; the suffumigation with incense of crowded places of worship; the regulation of diet; the choice and conservancy of water supply; the management of the sick and the seemly disposal of the dead. They embody, in fact, a system of Public Hygiene which, if strictly adhered to and carried out to its fullest extent, would alone be nearly sufficient to meet the requirements of the most exacting sanitary reformers of the present day.

Within the time allotted to a brief lecture, it will be impossible to do more than allude slighly to the most prominent features of a Sanitary System for India. In doing this, I shall request your attention to a few remarks on the following subjects:

The Prevention of Famine and Pestilence.
Water Supply.
Household and Town Drainage and Cleanliness.
Disposal of the Dead.
Personal Habits.

It has been found, from the earliest historic periods, that those two direst scourges by which the human race is visited—Famine and Pestilence—naturally, and almost invariably follow each other in the direct relation of cause and effect. Starvation leads to despair; to neglect of all rules of self preservation, except the vain search for food; and to the crowding together of vast masses of hopeless perishing wretches

among whom the Pestilence arises, to finish the work of destruction which Famine has commenced. Pestilence, on the other hand, leads to the abandonment of all hope and of all forethought, except for the life of to-morrow; strong hands fall from the plough; the fields lie fallow; the water courses remain dry; the beasts of burthen pine in their stalls or perish by murrain—"sufficient for the day is the evil thereof"—until, at length, Famine crowns the national misery and neglect as their natural and inevitable sequence.

It would be strange if the enlightened philanthropist in India

"————looking over wasted lands,
"Blight and Famine, Plague and Earthquake, roaring Deeps and fiery Sands"—

should not attempt to discover, with a view to their prevention, the causes of those national calamities which, as in 1777, 1807, 1823-24, 1832-33, and in many previous and succeeding years, carried death, by starvation and pestilence, throughout some of the best cultivated and most populous districts of Southen India. Careful investigation has shewn that, while the principal cause of Famine, in India, has been excessive Drought, the evil has been aggravated by the following causes,—errors and neglect on the part of the cultivators; a want of acquaintance with agriculture as a science; defects in the system of irrigation; the absence of adequate means of communication between the famine districts and others more plentifully supplied; apathy, and inability to afford relief with sufficient celerity on the part of the merchants of more fortunate districts; and, lastly, the want of advances from Government.*

It is not too much to assert that several of the great works which are rapidly approaching to completion, under the auspices of the present Government, will conduce materially to protect India against these evils in future generations. That stupendous work, the Ganges Canal, which now brings almost certain immunity from Famine to nearly six millions of souls inhabiting the districts which lie between the Ganges and the Jumna, may be regarded as only the first of a great series of undertakings with a view to secure at once the irrigation and the inland

* See the arguments adduced by Mr. Thomas, of the Madras Civil Service, on the inapplicability of the non-interference system, recommended to Governments in times o Famine by Adam Smith, to the circumstances of India, *Madras Quarterly Journa of Literature, No. XXII.* 1839; and *Corbyn's India Review of the same year.*

traffic of India. The short Railway lines which are now open at Howrah and Byculla will, under Providence, extend into an iron net-work, over which, at a few hours notice, supplies equal to any exigency could be poured into a famished district from the remotest granaries of British India; while the task of conveying intelligence throughout the land with a speed second only to that of lightening has, even now, been almost effected by the constructor of the Electric Telegraph. The plan of affording the Natives of India practical instruction in Scientific Agriculture has received much consideration and some trial; and will, doubtless, be carried into effective operation at no very distant period.

Further, the researches of modern science have demonstrated that a little skill and industry are alone required to render the Elements themselves subservient to man in the fertilization of corn and pasture lands. In the year 1848, circulars were forwarded, by order of the Court of Directors, to the medical officers throughout the Bengal and Madras Presidencies with a view to ascertain the effects produced by the presence of trees upon the climate and productiveness of their several districts. This enquiry led to the deduction of several very important results,—especially to those adduced by Dr. Balfour, General Cullen, and Surgeon Charles Smith, who appear to have demonstated the facts—that rain, and dew, and running water are always most plentiful in well-wooded districts; that, in all forest tracts, the temperaure of the air is more equable throughout the year; that, in tropical regions, the atmosphere of a country without trees has an arid dryness which is totally dissimilar to the cool softness of a well-wooded one; that forests and trees afford the shelter from violent winds which is absolutely essential to the health of the vegetable creation; and, lastly, that the extensive clearance of a country diminishes the number of its springs, and, consequently, that of the running water which flows over its surface. These facts, which every large agriculturist may apply safely and with certain advantage in his own lands, bring under consideration a principle in agriculture, long known but rarely sufficiently acted upon,—namely, that natural fertility is by no means essential to the productiveness of lands in any country. It was observed by Burckhardt, the great explorer of the Arabian Deserts, that—"wherever the ground can be irrigated by wells, the lands may be made productive." So it was found, in ancient times, that Babylonia and the Holy Land, which were originally and are now again a sandy desert and a tract of stony mountains, through which flow the rivers Euphrates and Jordan,

were, for many generations, rendered by human industry the richest and most fertile lands of which history possesses a record

The Prevention of Pestilence is an undertaking which,—although fully believed, by many of the wisest amongst us, to be perfectly feasible,—has scarcely been attempted by any nation;—for it is the enterprize and the wealth of a great nation only that can undertake the task of removing those wide-spreading causes of pestilence which are known to exist in vast morasses; upon the margins of ill-defined lakes; and of unembanked rivers; over the entire surface of flat alluvial countries, like Bengal, in which, during a considerable portion of the year, the land can scarcely be distinguished from the water; and throughout those tracts which are entirely choked by the unchecked spread of useless and noxious vegetation. A great step, however, in the right direction was taken in 1853, by our Government, in deciding that the Soonderbuns,—that enormous spread of marsh and jungle within whose recesses the worst plagues of lower Bengal and of theArracan coast are constantly maturing—should be thrown open, at almost nominal rentals, to enterprizing cultivators. This was an enunciation of the great principle which appears to promise best in effecting these national improvements. Wherever the deciduous vegetation springs up most rankly and perishes soonest, engendering the ague and the pestilence—there, whenever the fire, the axe and the plough shall have passed across it, will the waving corn afford the richest compensation to those whose enterprize shall have achieved the reclamation of the land.

At present, however, we must be mainly content with removing or guarding ourselves against those local sources of pestilential and other diseases which lie imediately around us. Here we find abundant and most useful employment in the drainage and reclamation of the smaller marshes; in the improvement and conservancy of tanks and natural ponds; in the prohibition of rice cultivation around towns; in the rooting out of all waste jungle, (its place being supplied by the larger and fruit bearing trees, in sufficient number for shade and concealment, but distributed in such a manner as not to exclude the air, and placed sufficiently far apart not to prevent the escape of deleterious exhalations from the underlying earth and water); and, further, in the judicious choice of building situations; in attention to ventilation; and in the proper drainage and cleaning of public streets, roads, and bazars.

Water Supply.—Desirous as every native of this country is to

secure a sufficient supply of water in the immediate vicinity of his own house, it is extraordinary how completely the majority fail in obtaining this first of all necessaries. The Hindu and Mahomedan sovereigns of old vied with each other in the splendour of their undertakings to secure ample supplies of water to their subjects. Thus we read of Cheitmul, King of Bengal, a proselyte to Mahomedanism, who, towards the end of the 12th century, excavated the largest reservoir in the city of Gour; of Shere Shah, Emperor of Delhi, who, about the year 1540, constructed a well-shaded road 2,000 miles in length, from Sonargong in Bengal to the banks of the Indus, furnished with wells and caravanserais at every stage; of Feroze Sha celebrated for his "hundred aqueducts and reservoirs"; of those vast tanks in Assam made by the Barabuinia, the ancient princes of that country, in which they are fabled to have sunk their enormous treasures of gold and silver vessels. Still, across many a stream-traversed valley in India, may be traced the remains of those enormous bunds (constructed upon a scale which the enterprize of none but princes could achieve) by which the waters were formerly dammed up for purposes of irrigation. The Bhuddists of Ceylon too, in the days of their posperity some two thousand years ago, were in no way behind their Indian neighbours in these undertakings. It was stated, by a traveller who visited the spot in 1846, that many of the tanks in the neighbourhood of the desolated royal city Anurajpoora are from ten to fifteen miles in circumference; and evidently, at one time, supplied water to extensive tracts of country. Those within the walls are surrounded by dykes formed by gigantic blocks of granite which astonish even the European traveller by their enormous size. The Natives of the vicinity gravely maintain that these reservoirs were the works of giants—not of ordinary men. It was estimated, by an intelligent officer who visited the district in 1830, that it would be beyond the power of the local British Government to restore even one of these vast excavations to its first condition. It appears always to have been considered a sacred duty, alike by Hindus and Mussulmauns, to excavate tanks for the benefit of their neighbours and for the perpetuation of their own names. It has been well remarked that it is much to be regretted that the patriotism of these public benefactors did not extend to the length of inducing them to leave, in addition, small sums for the preservation and cleansing of the banks and waters of these tanks in perpetuity; since it can add but little to the posthumous

fame of any native gentleman that, as in nine cases out of ten is literally the case, the once beautiful tank which bears his name has become the greatest nuisance and public offence in its neighbourhood. I know no reason why it should not be rendered obligatory, in the case of every person who applies to the local authorities for permission to excavate a tank, that a certain small sum should be deposited with the Magistrate or Collector for the preservation, in perpetuity, of the bunds and waters of that reservoir. In a perfectly level country, like Bengal, visited yearly by torrents of rain, but furnished with comparatively but very few springs and rivulets for the collection and voiding of the surface water, the multiplication of tanks becomes an object of absolute necessity: and, where this task is fulfilled with judgment, the results are excellent. The heat of the air is tempered by the extended sheets of pure water; the otherwise marshy and oosy soil is drained and rendered wholesome, alike to the inhabitants and to the crops; and means of irrigation are always available, even in the dryest seasons. In all India, there cannot be found any object more delightful or more healthful than the deep and spring-fed tank with sharply defined margin and well-kept banks. But, unhappily, the practice of tank digging, as at present followed, is productive of far more evil than good throughout Bengal. Where, as is generally the case, every hovel has its separate tank or mud hole formed probably in excavating earth for the foundation of the hut; where a very large proportion of the reservoirs have been rendered unclean,—the dead bodies of men or animals having been discovered in them; where many can only be used for purposes of ablution, and nearly all receive the pollutions of house drains and street gutters, it is hardly surprising that the fever, the spleen, the cholera and the dysentery, which marshes and poisoned waters engender in all countries,—but in India with the deadliest virulence,—should every year seek entrance at every door.* In addition to the remedies for these evils already hinted at, the establishment of the following

* In an elaborate investigation of the Vital and Medical Statistics of Chittagong undertaken by my friend Mr. Bedford a few years since, it was found that, out of 3,274 acres upon which the sudder station and town stand, no less than 251 acres are occupied by tanks. These were 522 in number constituting a surface of stagnant water, presenting one mass of green vegetable matter, receiving all the neighbouring filth, but still resorted to by the inhabitants for drinking and cooking purposes.—And thus it is throughout Bengal.

rules would probably be attended with great benefit to the health and convenience of the public.—That every person digging a tank should be compelled to excavate to a certain depth, that a spring may be reached if possible. That every tank, the bed of which is liable to become exposed even in the dryest seasons, should either be dug deeper or be filled up at the owner's expense, the magistrate or other municipal authorities having power to carry out these objects in all cases where they could not be effected by the owners. That the commission of nuisances in the neighbourhood of tanks and the leading of house or street drains into them, should be offences severely punishable by law. That, wherever it is necessary to excavate earth, either for the repair of roads or for building purposes, the materials required should be removed evenly from the margins or beds of deserted tanks or from portions of waste ground set aside by the municipal authorities; which pieces of ground should not be delved into irregularly, but in the form in which tanks are systematically dug. That the excavation of mud holes and of small shallow tanks in the close vicinity of huts should be strictly prohibited. All tanks held to be polluted should be reported to the municipal authorities, who should give their owners the option either of keeping them in good condition or of filling them up. In every town and village, tanks should be exclusively set apart, as reservoirs of drinking water, as places for washing clothes, and as bathing-places for males and females. The owners of tanks should be bound to keep them pure by the occasional use of a few maunds of chunam (lime), if called upon to do so by the municipal authorities. They should also be compelled to keep the surface of the water free from mantling of small green weeds. The large weeds, or tank jungle, which grow in deep reservoirs, are however rather useful than otherwise. The breeding of fish in tanks should be encouraged. These, as well as the larger vegetable growths, tending materially to enhance the purity of the water.

The most expedient mode of supplying cities in India with water is a problem of nearly equal difficulty whether regarded in an engineering or in a financial point of view. It is probable that, even in the most densely peopled cities, a supply fully adequate to the purposes of drinking, ablution, and sewer cleansing might be procured by the collection of surface water; extreme care being taken, and no small cost being allowed to secure the proper keeping of the collecting grounds which might, at the same time, be made available, under proper restrictions, as places of exercise

and recreation for the inhabitants. For example, the whole of the water which descends annually upon the Calcutta maidaun, might, with due care, be collected, in proper reservoirs, with filtering beds attached, and might be distributed by a moderate steam power, at high pressure, at least to the southern half of the city;—the whole of the waste water being allowed to find exit, through the sewers, in another direction. The details of the various plans which have, from time to time, within the last thirty years, been mooted for supplying Calcutta with water, would, if arranged consecutively, form, in themselves, a curious and instructive history in illustration of those two great stumbling blocks in the path of the sanitary reformer—*Insufficient Knowledge, and Deficient Means.* The projects which, at present, best deserve notice, are those submitted to Government by Mr. Simms and Captain Young. The former gentleman proposed to collect a supply by a suction pipe from about the centre of the river Hooghly, at a spot between Paltha Ghat and the Gunpowder works at the entrance of Nabobgunge Khall. This spot is eighteen miles above Fort William, and is considered by Mr. Simms to be above the influence of the salt water, except perhaps occasionally at extraordinary high tides about the time of the vernal equinox, when he admits that the water becomes unfit for the purpose and somewhat brackish; during which short period, however, the pumping engine could cease drawing the supply. About 7,590,000 gallons of water could be raised daily, by a steam engine of 200 horse power, into two circular reservoirs of equal capacity, each containing a week's supply, by which arrangement one might be emptied for cleaning without detriment to the supply;—these reservoirs would be artificially raised 12 feet, which, allowing for the natural fall, would place them 24 feet above the Calcutta level. The water, having undergone purification in extensive filters, would be forced by steam power into mains leading through the city, with a pressure that would deliver it into elevated cisterns in each house. The means of communication between the works at the source and those at the delivery—an extent of 13½ miles—might be either by an open conduit or canal, by close cast iron pipes, or by an aqueduct, elevated above the surface of the ground. This line of channel would also have to be constructed in duplicate. Mr. Simms estimates the total outlay, upon these works, in the first instance, at £ 670,197: the expense of house-fittings would amount to £ 250,000 more, and annual expenditure to £ 55,480. Mr. Simms further calculates that the working of his system would realise an income

of £1,19,101 per annum without difficulty, leaving a profit of at least 9 per cent. annually upon the project. Captain Young and Mr. Hawksley, 6 Civil Engineer of some eminence, have come to the conclusion that a water system, such as might be confidently recommended for Calcutta, might be established at an outlay of only £1,60,000. This, under a modification of Mr. Simms' plan, would supply Calcutta with no more than 3,000,000 gallons of water daily. The most valid and material objections to these plans are,—first, that the supply would be drawn from a river which is the receptacle of the dead bodies of nearly the whole of the inhabitants throughout its course, and for some two or three days' journey inland; while, by a certain law in hydrostatics, no small proportion of these vagrant corpses would tend to gather towards the suction pipes of the apparatus with a passive pertinacity almost tantamount to the activity with which bees fix themselves at the mouth of a honey jar. This may, possibly, be a removable evil, but there remains, further, the objection that one day's supply of brackish water would probably be sufficient to decimate the inhabitants of Calcutta by Dysentery. Should an extensive plan of this kind be adopted in Calcutta, it would, doubtless, meet with many objections from certain of the high caste Brahmins. Most of these objections have been sufficiently combated by Mr. Simms in his report; it is questionable, however, whether any plan of artificial water supply would altogether meet the prejudices of this class; a very large proportion of whom, nevertheless, while continuing to procure their drinking water direct from the sacred river, would, in all probability, not object to contribute their quota to the new system, in consideration of its beneficial effects in freeing the sewers from impurities, and thus enhancing the salubrity of their neighbourhoods. Whatever course may be taken, as regards details of arrangement, every native of this country may prize the maxim of Avyar, the female Tamul Philosopher,—"Seek a house where good water is at hand"—as one of the very best that has ever proceeded from the mouth of a sanitary legislator.

In addressing an audience of native gentlemen, I need not pause to dilate upon the strictness with which the lawgivers both of the Hindus and Mussulmans have incorporated rules for personal cleanliness as an essential portion of their religious codes. There obtains, among the English, a proverb that,—"Cleanliness is next to Godliness"—but, with the natives of India, a person who neglects the prescribed ablutions

acts in daily violation of a sacred law.* The Mahomedan Sovereigns of India were celebrated for the magnificence of their public baths. The principal baths at Gour were erected by Cheitmul, the sovereign already alluded to; and, under Arungzebe in the seventeenth century, the city of Agra could boast of no less than eight hundred baths. Imperial Rome, in her greatest splendour, possessed seven hundred and sixty four.

The disuse in India of public hot baths, or Humaums, which went out at the fall of the Mussulmaun rule, (there being, I believe, no public hot baths at present in the country except those at Lucknow), is a circumstance to be regretted.† The establishment of Humaums in Calcutta has long been wished for; and it can scarcely be doubted that the eastern modes of steaming, warm and hot bathing, and shampooing would prove useful in several forms of disease. For ordinary bathing, however, well kept tanks set apart for the purpose would sufficiently meet the wants of the natives of India. The practice of anointing the body with aromatic oil after bathing, so usual in this country, is common to the native inhabitants of all hot climates, and is highly approved of by European physiologists. It appears to be one of the best securities known against pestilential infection.

The Hindu practice, founded upon religious observance, of wearing a portion of the body-clothing while bathing, has always appeared to me to be erroneously carried out. It can certainly never have been intended by the law giver that those bathing in the coldest season should, after leaving the water, retain their wet garment, thereby incurring the evil consequences of cholera, dysentery, chronic rheumatism, and a peculiar form of skin disease, which are manifestly often determined by that cause. This practice, doubtless, obtains mainly among the poor; yet there are surely few so extremely needy as to be unable to lay aside, for bathing purposes,

* Ablution is ordered in the Shastras as being conducive to health, requisite to cleanliness, and efficacious in removing spiritual as well as corporeal defilements. Indeed,—judging by the words "As a tired man leaves drops of sweat at the foot of a tree; so he who bathes is cleansed from all foulness; as an oblation is sanctified by holy grace; so may this water purify me from Sin"—which form one of the many prayers which the Brahmin is directed to repeat while bathing,—it would appear that this is a ceremony which holds nearly the same position in the Hindu religion which the rite of Baptism does in ours.—*Colebrooke, Asiatic Researches, vol. V.*

† "In the house west of the Police Office in Lal Bazar were formerly placed Asmaans or warm baths."—*Calcutta Review*, Dec. 1852.

a garment sufficient to meet the religious rule. I make this remark, as the rheumatism of this country is, alone, a disease of such fearful severity and obstinacy among the poor that it appears desirable to enquire whether it is not frequently incurred in the observance of that which is, by misinterpretation, regarded as a religious duty.

The subject of House and Town *Drainage* is one of far too large a scope to be discussed at present. It will be sufficient that we should allude to one or two leading facts of practical moment. It will be borne in mind that the task of draining any portion of a perfectly level country, like Bengal, is one which cannot be effected without great engineering skill, much labour, and heavy expense. The ancient philosophers fully appreciated the value and importance of such undertakings.—"Him who fills up a public ditch"—says Menu—"the King shall speedily banish."—It would appear that the active operation of poisonous exhalations from drains in producing fever and other diseases is, even popularly, well understood in India. It is stated, in a recently published article on Hygiene,* that there are certain female exorcists in India who, considering that bad fevers and raging epidemics are the results of demoniacal possession, seize the patient by the hair, and flogging him vigorously with a slipper, shout—"Fiend begone to the Drain whence you came!" So also the English Sanitary reformers tell us that, in the bubbles which are generated upon the black and sluggish stream of curdling sewer filth, the Spirit of the Cholera and Dysentery passes forth to slay. In the haunts of moral and physical pollution where the filthiness of the body and the foulness of the mind act and react upon each other until the result is utter abandonment,—

> "Midst slop, and rot, and want, and crime,
> *He* lies securely, biding his time."

But, as the authority already cited appropriately says,—"To send the Demon *back* to the sewer, is but Hindu or London sanitary practice—We must try to *expel* him thence." Had they done nothing more, the sanitary reformers would have conferred a boon upon humanity, in setting forth the principle, which their researches have fully established, that—*No Drains are better than Bad Drains*. This principle, which has been extensively carried out by Mr. Woodcock in the jails of the N. W. P., appears

* Eclectic Review, October 1853.

to be particularly applicable to the villages and smaller towns of India, where, at present, all the system of drainage consists either in voiding the sewage filth into the drinking water of the tanks, or in forming closed trenches before the houses in which all the drainage matters are allowed to settle, forming stagnant pools admirably calculated to poison the inmates. In villages, the wisest course decidedly is to have the roads traversed by ditches which, at proper levels, (the ditchers of this country, however, unfortunately can never be brought to observe the levels) should lead into those tanks which are set apart for washing purposes. All persons should be strictly forbidden, under severe penalties, from throwing any offensive or decaying animal or vegetable refuse into these ditches or upon the roads, and chowkedars should be appointed to see this rule observed. All such matters should be scattered upon garden ground, or be carried out into the fields—essentially a Hindu rule—or, where this is impossible, owing to the crowding of the houses, pits should be set aside by the municipal authorities for this purpose, care being taken to disinfect their contents occasionally by the addition of lime, and to fill them up and open others from time to time. I believe that small sums occasionally laid out in this manner would render the construction of expensive pukkah drains in small native towns altogether unnecessary. A putrid animal or vegetable matter poured upon a solid road or into a brick-lined channel, in which there is little or no fall, or into a ditch the bottom of which is formed of tenacious mud, can only become decomposed by evaporation. If, on the contrary, it be thrown upon newly-turned soft earth or upon a grassy spot, the evaporation is but inconsiderable, it rapidly sinks into the soil, where it meets with chemical disinfectants, and is speedily converted into a rich manure. A badly constructed drain, therefore, is one of the last places into which such matters should be thrown. Many of my hearers will be surprised to learn how valuable those drainage matters (which—now wholly neglected and unemployed—form the chief sources of disease and death in our towns) may be rendered for manuring purposes. Mr. Dempsey, C. E. makes the following interesting statements, in his popular treatise on drainage, upon the authority of Messrs. Cresy and Ranger, Superintending Inspectors of Sewers under the General Board of Health. "Mr. Cresy, in reporting upon the present sanitary condition of the borough of New Windsor, and offering his official recommendations for its improvement, estimates the population at 10,200, and the annual value of the sewage manure at from £ 1,000 to £ 1,500. And, for the

first cost of the apparatus for distributing this manure, he allows an expenditure of £ 4,000, being £ 3,000 for 10 miles of pipe, and 1,000 for pumping Engine, &c. Mr. Ranger estimates the value of the sewage matters of the town of Uxbridge to be at least equal to £ 1,700 per annum, the population being 3,219 (in 1841) or about 10*s.* for each person; and for the first cost of the distributing apparatus, he allows £ 3,500. In reporting upon the town of Eton, of which the population was 3,526 in 1841, Mr. Cresy estimates the value of the excreta, or sewage matters, at £ 500 annually and the cost of main sewers and tanks for the sewage at £ 1,000. Thus, Mr. Dempsey continues, these estimates of the value of sewage vary from 2 shillings to 10*s.* 6d. per individual, between which our average of 5*s.* is certainly a safe medium, and the allowance for the first cost of apparatus for pumping, &c., varies from about 6*s.* to £ 1. 2*s.* per individual."

He therefore assumes £ 1 as a safe average. Upon this certainly not very definite calculation, we may be justified in reckoning that, upon an outlay of twenty lacs of rupees, the drainage matters from the houses of every 1,00,000 of the inhabitants of Calcutta might, instead of continually offending the senses and carrying pestilential disease and sudden death throughout the city, be made available for agricultural purposes at a return, upon the lowest estimate, of five lacs per annum, or an interest of 25 per centum upon the first outlay. These facts are not likely to be very speedily acted upon in India; but those industrious agriculturists, the Chinese, have long been inthe habit of practically carrying out the principle which they involve. China, being an over populated and in many parts a naturally barren country, every available corner of ground is cultivated to the utmost. Every village contains reservoirs for manure which are strictly guarded and into which every available material is thrown—even, we are told, down to the wipings of the barbers' razors.

Owing to the level nature of the ground upon which the city is built and its very slight elevation above the level of the river, the drainage of Calcutta has always been viewed as an engineering task of extraordinary difficulty. I have never been able to ascertain by whom the present system of drainage in Calcutta was devised. As, however, it was evidently introduced previously to the publication of the researches upon which the modern systems of town drainage are based, I trust that I shall offend no one in declaring the undeniable fact that, for the most

part, the drainage of this city takes a foremost position among those kinds of drainage which are, to all intents and purposes, in a sanitary point of view, infinitely worse than no drainage at all. Whoever has traversed, during an interval in the rains, one of the narrow ways which form a mesh-work between the spot on which we now stand and the Lall Bazaar, and has inhaled the poisonous odours which there exhale, on every side, from the black stagnant surfaces, bubbling under the torrid sun, at the bottom of the uncovered sewers—*sewers without any perceptible fall*—will, without any engineering skill whatever, be sufficiently able to appreciate this fact. The matter for surprise is—not why so many fall by pestilence in the native quarter of this city;—the wonder only is that so many survive, when, under the threshold of every house, a reservoir of pestilential vapours yawns continually. I observe it noticed from time to time, in the public prints, that some native gentleman in this town has devoted a certain sum for the drainage of the street in which he lives, and hopes to live for some time longer. I would only say to any such philanthrophist,—Baboo, reserve your money for a better system of drainage—He who lays out his money in providing the city with such tanks as that in your own compound, and such drains as those in your own district, deliberately endows his townsmen with a perpetual gift of Cholera by the biggah and Pestilential Dysentery by the hundred yards. In saying this, I must repeat, I presume to reflect upon no one. Those who planned the Calcutta sewers were, doubtless, guided by the best science of their day; and, deficient as the sewers are, it is scarcely in the power either of the Municipal Commissioners or of the Government at once to remove such costly works, and to supply others still more expensive. It is well known, by public announcement, that the Government are fully aware of the defects in the present sewage plan of this city, that they are desirous to adopt a better system, and that they have called for and have published reports on the subject; one of which—that sent in by the late Dr. Pearson—is especially valuable. It is, however, necessary to bear in mind that,—it being a law in nature that every man must labour for and pay for the advantages which he receives,—works of public benefit of this kind must be, and ought to be paid for by the public.

Few nations appear to have viewed the safe *Disposal of the Dead* as a duty essential to the well-being of the living. None have judged in this manner with more unimpeachable wisdom than did the ancient lawgivers of the Hindus; and none, I must venture to say, and will en-

deavour to prove, have departed further and with more fatal error from the injunctions of their legislators than have the Hindus of modern times. The people of Ancient Rome, of Greece, and Germany burnt their dead until ashes alone remained. There was something surpassingly grand in that custom of the old Romans, and in the faith which they held, that—after the last conclamation of the dead had been made, and the corpse had been carried forth, not coffined, but in the view of all men with its steadfast face bare towards heaven; when orators and poets had proclaimed the virtues of the departed, and, all but one standing reverently aside, flame had been laid to the funereal pyre, the vast heap of precious woods flaming forth, and the costly trappings of the dead soaring up, amidst the blare of trumpets and the shouts of thousands, and borne up by a pillar of fire and clouds of sweet incense,—the spirit of the philosopher or the warrior arose to God.

Not less seemly and sanitary was the rite of incremation prescribed by the Hindu lawgivers. Immediately after death, the corpse was to be washed, perfumed, and decked with wreaths of flowers, and a cloth sprinkled with fragrant oil was to be thrown over it. It was then to be borne with reverential deportment by the nearest relations to some holy spot in the forest or near water. It was to be preceded by fire, and by food carried in an unbaked vessel. According to its caste, it was to be borne forth from a certain gate of the city. Should the road pass through any inhabited place, a circuit was to be made to avoid that place. Upon reaching their destination, the sons or other relations of the deceased, having bathed in their clothes, were to prepare the funeral pile with a sufficient quantity of fuel on a clean spot of ground which, if the deceased were a priest, they had first consecrated by certain ceremonies. The corpse was then again to be washed, clothed in clean apparel, and perfumed, and to be placed supine upon the pile which had previously been hung with flowers. Then, a cloth being thrown over all, a relation of the deceased was to fire the pyre with an ignited brand, invoking the Gods. The fire was to be so managed that some bones might remain for the subsequent ceremony of gathering the ashes. After this, all who had touched or followed the corpse were to perform an ablution in running water; and, after having changed their clothes, to sip water, without swallowing it, before repeating certain prayers. After some days, varying in number according to the rank and caste of the deceased, the bones were to be gathered from the pile and

ceremoniously buried, and the ashes of the pile were to be thrown into the water. At a subsequent time, the nearest kinsman was to disinter the bones and to cast them, in their enclosing vessel, into the Ganges. It must be repeated that a more perfectly sanitary mode of disposing of the dead than this could scarcely be devised. What, however, shall be said of the practice now commonly adopted? Acting, as it would seem, upon the principle which is held to form an essential part of the Hindu System—that each of the elements shall receive a portion of the human body at its dissolution*; and, doubtless, in most cases, being reduced by extreme poverty to adopt so miserable an alternative, the friends or the Brahmins of the burning ghat, with a few scanty rites, merely scorch the face of the dead, and then commit the body to the sacred river—True, it is believed that Gunga's waters hallow every object, however impure or accursed in itself, upon which they flow. This explanation might satisfy the Hindu, had not the alternative of a seemly rite been allowed him; but *this* is assuredly a departure from the strict religious rule. How fearful a departure. Look, Gentlemen, upon this wretched picture.—The body is washed hither and thither by the rushing water—dead but never resting—obscene and horrible—a prey to the gnawing fishes below, a roosting place for the tearing carrion birds above—Is this a seemly or a holy dissolution for the body of the mother who nursed you, or of the father whose arm, until yesterday, was alone held steadfastly between you and the worst ills and vicissitudes of your life?

But, you will reply,—this fate is not reserved for our kindred and for ourselves;—yet, the evil being admitted,—its cause is *Poverty*—where is your remedy? My answer is,—amid the sudden changes of life in a great city, none can tell what fate is reserved for him and for those dearest to him;— then a remedy for the evil is at hand—it is *Generosity*—surely that is not an unattainable good. I find it stated, in a work of great research and high authority, that the actual expense necessary for completely consuming a body amounts to only two rupees. This statement has been confirmed by enquiries made at the Nimtollah Burning Ghat. There is wood enough in the Soonderbuns—Burning to ashes is the strict law. Two small pieces of silver for each body is the expense.—Surely there must be, among the wealthy native gentlemen of Calcutta, at least one who would be willing that his name should go down to posterity

* Forbes, vol. 3, p. 11.

marked with the honor of having restored the ancient law, and of having freed his sacred river of those horrors which render it frightful and detestable to all other nations.

No physiologist who has studied the laws respecting *Food* laid down in the Hindu Shastras can have failed to be struck by the wisdom which has regulated them; and, especially, by their strict applicability to the physical requirements of the Hindus. Thus, it is now well understood that the natives of very cold climates, and those who are occupied throughout the day in extraordinary muscular efforts, require to be supplied with large quantities of animal and fatty matters, these being needed, in the first place, to assist the generation of animal heat in the system, and in the second, as compensatory to the rapid wear and tear of the muscular structures of the body. Hence, in the one case, the Esquimaux and the Russian Peasant subsist mainly upon fish oil and fats of the coarsest description; while, on the other, the native hunters of the S. American Pampas live almost entirely upon the milk and flesh of horses and wild cattle. To those, on the contrary, who inhabit countries within the tropics, where the respiration is not active, where the muscular movements of the body are necessarily languid, and where the action of that organ which has principally to remove nitrogenised and carbonized materials from the system,—I mean the liver—is, from many causes, liable to become over excited, those articles of food which aid the production of inward heat and of muscular flesh are far less necessary. Here, the need is for cooling vegetables which contain little or no nitrogen; for those which produce fat in small quantities; for those which, taken sparingly, should moderately supply the muscles with nitrogenous matter; for those which, by their aromatic nature, should assist and stimulate the stomach in digesting the others. Had Liebig himself devised the dietary of a studious Brahmin pandit, who remains seated during a great part of the day, reads and prays much, sleeps a good deal, and has a tendency to become rather too fat, he could not have suggested any thing more appropriate to the wants of his system than his daily meal of rice, flavoured with dall to which ghee or mustard oil has been very moderately added, and which has been highly spiced with red pepper. Equal wisdom has been shewn in allowing a larger, but still very restricted, proportion of animal food to those of the lower classes who are engaged in more active labour. Fevers, therefore, and diseases of the liver being the most prevalent diseases

of this climate, wisdom, I would repeat, is shown in abstinence from or very moderate employment of those meats and stimulating liquors which increase the generation of animal heat and excite the liver to over action. One example, out of a thousand, may be given.—It has been observed that liver complaints, especially in an acute form, are almost entirely unknown amongst the French inhabitants of Pondicherry. This exemption from a disease so prevalent and fatal amongst the British residents in India is attributed to the great moderation which the French observe in the consumption of animal food and stimulating liquors—they subsist entirely on vegetable food and curries, and take little besides the light wines of France. The practical inference from all this is self evident,—that the natives of this country cannot act more wisely than by adhering to the dietetic rules which their lawgivers strictly prescribed, and which their ancestors rigidly conformed to—All imitation, on the part of natives, of the European modes of living cannot be too strongly deprecated.

There is one subject in our course so painful that I would rather avoid it than discuss it at length. Still a few words of friendly warning must be spoken. But too many appear to overlook the fact that Drunkenness is a vice even more strongly denounced by the lawgivers of the Hindus than by the scripture of the Mussulmauns—Are the precepts of the prophet.—"Oh true believers surely wine is an abomination;" and again—"Concerning wine and lots, in both there is great sin, and also some things of use to men; but their sinfulness is greater than their use"—are these laws more binding than those in the Shastras and in Manu which place the the sin of drunkenness among the Mohapatak,—only second to the inexpiable offence of slaying a Brahmin? Indeed, in the Vedas, the use of Wines and Spirits and Spirituous Liquors is strictly prohibited. In the Tantra this law appears to be relaxed. The worshippers of Shiva alone are permitted to indulge in their use. How far these salutary laws of the ancient religion are adhered to in the present day your observation and your own experience will best tell you. Certain it is that, both among Hindus and Mussulmauns throughout Bengal, the infractions of the laws of sobriety, in the excessive use of spirituous liquors and in the destructive practices—if you find the most learned physicians assuring you that they are innoxious give no credit, for they are deadly—the fatal habits of opium eating and gunjah smoking are deplorably prevalent. Hear what the most eloquent

denouncer of intemperance of the present time, one too who was once under the curse himself, but who manfully, under Providence, struggled to the light, has learned by dire and bitter experience of this vice:—

Take the man that has been all his lifetime a slave to evil habit; what has he got? He has spent his life—his fortune; he has bartered his jewel, sold his birth-right, and what has he got?—nothing but the mere excitement of chasing after that which is not reality. Men talk about enjoyment in these pursuits. There is no enjoyment. The enjoyment is merely momentary and imaginary. No man ever received solid satisfaction in wicked pursuits that he could long enjoy and hold fast. "Aha! aha!" he says, "now I am happy." It has gone from him. And the enjoyment that men can obtain in this world, apart from the enjoyments that God has sanctioned, are enjoyments that lead to destruction, through the power of fascination, habit, and excitement. It is as if a man should start in a chase after a bubble. Attracted by its bright and gorgeous hue, a gay set of merry companions with him, it leads him through vineyards, under trellised vines, with grapes hanging in all their purple glory—through orchards under trees, bearing their golden, pulpy fruit—by sparkling fountains, with the music of singing birds. He looks at life through a rose-coloured medium; and he leads a merry chase. In the excitement he laughs and dances, and dives and laughs again. It is a merry chase. By-and-bye that excitement becomes intense—its intensity becomes a passion—its passion becomes a disease. Now his eye is fixed upon it with earnestness, and now he leaps with desperation, pleasure, and disappointment, mingled with excitement; now it leads him away from all that is bright and beautiful—from all the tender, clustering, hallowed associations of by-gone days; it leads him up the steep hot sides of a fearful volcano. Now there is pain, anguish in the chase. He leaps, falls, and rises; scorched, and bruised, and blistered. Yet still the excitement and power of evil habit become almost a passion. He forgets all that is past, or strives to forget it in his trouble. He leaps again. It is gone! He curses and bites his lips in agony. He shrieks the wild, almost wailing shriek of despair. Yet still he pursues his prize, knee-deep in the hot ashes. He staggers up, with torn limbs and bruised, the last semblance of humanity scorched out of him. Yet there is his prize, and he will have it. With a desperate effort he makes one more leap; and he has got it now; but has leaped into the crater with it, and with a bursted bubble in his hand he goes to his retribution!*

I would only say a few words, in conclusion, to encourage you to believe that the adoption of a sanitary system throughout India must originate with the people themselves, and is neither beyond their means nor entirely apart from their inclinations. A great mercantile people, like the Hindus, cannot require a demonstration of the fixed principle in political economy—that, *wherever an individual or a people is desirous to acquire certain personal or national advantages, those advantages must be fully paid for out of that individual's or that nation's purse.* Nothing, in this world, that requires the study or the manual labour of others

* John B. Gough in "Lectures to Young Men" 1854, p. 64.

can be obtained without a price. The question for our consideration therefore is,—Will the people of this country become convinced that it is as necessary to the salubrity and decency of a city that its streets, and its drains, and its aqueducts should be carefully and cleanly preserved, as it is to the health of a man that his body should undergo daily purification?—This being admitted, will not many be willing to pay for the water and the brushes? It has been alleged, I think rashly and unkindly, that the rich natives of India give only out of ostentation and for a name. Among mankind, few virtues can be found untainted with selfishness;—let us welcome and honor the good, where we find it, without searching too deeply for the venial weaknesses which leaven it. While the love of power is allowed to the honest statesmen; while the thirst for glory is not denied to the humane general; while fame is given to the devotee of science; while the honors of temporal dignity are accorded to the holiest and most learned in the ranks of the servants of the church;—let not due respect be denied to those citizens whose generosity shall first bestow the blessing of HEALTH upon this land.

But one more passage to assure you that great self denial, for sanitary purposes, is not beyond the disposition of the people of Bengal. Far on in the sixteenth century, the royal city of Gour had, for nearly two thousand years, been famous throughout the world as one of the most beautiful in existence. It was, emphatically, "the Capital of a Hundred Kings," each one of whom had lavished upon its palaces, its temples, its gardens, its baths, all the magnificence which oriental imaginations, aided by stupendous wealth, could suggest. The vast extent of this city then stretched for miles along the left bank of the Ganges. Its glory had reached the culminating point, when, suddenly, there occurred one of those changes in the course of the river to which allusion has already been made, and the city remained, as we now find it, some miles inland on the right bank, with the old bed of the river exposed and drying in the sun beside it. As this surface of ooze and slime parched and cracked, fever exhalations arose from it and, consequently, in the year 1575, the city was depopulated by a pestilence. Let us pause, for a moment, to judge what might be done by the people of Calcutta under similar circumstances,—such an accident being by no means beyond the range of possibility. The unhealthy season having passed away, crowds who had sought refuge from the plague in neighbouring districts would return to their

offices and to their mansions, to stand the trial of another season. While a single score of proprietors survived, how loud would be the clamour about property, and leases, and pottahs, and beegahs, and mooktearnamehs, and vested rights which would meet every suggestion of abandoning such a city, erected at an outlay of countless millions. But what did the Mahomedans of Gour,—so notorious for their fatalism, what did the Hindu Bankers of that city—so full of mercantile cautiousness and "eastern apathy?"—They reflected that their city was beautiful, and was rich,—but they knew that its climate was deadly,—and they abandoned it at once, with all its marble gates and all its golden domes, to the jackal and to the tiger, and to the fever cloud which brooded paramount over all. They left it—to be known in after ages as a monument of desolated human art and ambition—how accurately described in the words of the French poet,—

> "See from the stilly waters and above the sleepy swamp,
> Were steaming up the fever fog rolls grim, and grey, and damp,
> How the holy royal city—mighty GOUR, that silent town,
> Looms like the ghost of greatness, and of pride that's been pulled down.
> See how its twenty silent towers, with nothing to defend,
> Stand up like ancient coffins, all grimly set on end."

To be known and marked also, in all time, as an evidence that the people of Bengal love their lives better and more wisely than they love their gold.

Corrigendum.—Page 4—line 9 from foot,—for "has been,"—read "have been."—

With the author's Compliments

Rec'd 11.1.71

A

SANITARY ENQUIRY

INTO THE PROBABLE CAUSES OF

YEARLY EPIDEMICS,

IN ENGLAND, AS OBSERVED AT

LEICESTER.

BY

RICHARD WEAVER, C.E.,

SANITARY ENGINEER & ANALYST.

PRICE SIXPENCE.

LEICESTER:
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LONDON:
SIMPKIN & MARSHALL.

ENTERED AT STATIONERS' HALL.

The Sanitary Laboratory
Leicester
9th Jany 1871

Sir I have ventured upon forwarding you a copy of a small pamphlet containing a few observations on Sanitation. The causes of the annual autumnal Diarrhœa Epidemics wh have characterised this town for about 18 years are treated of. Observations of the attack during the last Summer & autumn (since publication) quite confirm what I had previously stated. I have however more fully noted that a large amount of Diarrhœa has been induced by milk dealers mixing dilution with water obtained from sewage and traced a number of infantile deaths to one dairy.

Yours obdt
Richard Weaver

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PREFACE.

It concerns all who regard the health of themselves, their families, and neighbours, to know something of the probable causes of yearly epidemics, and of the mode in which zymotic disease is diffused; for the very evident reason that they may guard against attack.

The present sanitary enquiry is confined to Leicester, yet the principles discussed are equally applicable elsewhere; indeed it may be that there are few places to which they are unsuited.

I desire here to express my obligation to the nobility and gentry of the county and to the numerous friends in this town who have accorded me their approval and support. More especially am I indebted to the Rev. A. A. Isaacs, Vicar of Christ Church, for his cordial suggestions and assistance. And to the veteran sanitarian, George Godwin, Esq., F.R.S., under whose standard I have long been an earnest worker.

The subjects discussed in this little pamphlet although local, are yet general, and from the fact of their universality, no reflections are cast upon anyone; but what is endeavoured to be shown is, that the sanitary requirements of the present day, as taught us by science, are much in advance of those of twenty years since.

RICHARD WEAVER.

Leicester, 13th June, 1871.

Sanitary Enquiry, &c.

In common with many other towns, but perhaps more persistently than most of them, Leicester is subjected to periodical outbreaks of disease of a zymotic type, and it has been observed that diarrhœal epidemics occur yearly, and at much about the same periods within certain limits. Generally, however, these attacks are preceded by, or accompanied with other diseases of the same order—such as Small-pox, Measles, or Scarlatina. And especially during last summer and autumn, the inhabitants suffered severely from a double attack of Diarrhœa and Scarlatina.

At the period of greatest severity, it was stated in the local papers that as many as one thousand cases of Scarlatina were at that time under treatment. Be this, however, as it may, the Registrar General shows in his return that this combined epidemic swept off nearly 500 of the inhabitants during its continuance of from four to five months; and it is remarked that those deaths were chiefly confined to the infantile population. As an enquiry into the probable causes of these annual attacks, or however the causes tending to render the people more susceptible to the influence of disease, will—if properly applied—result in advantage, not alone to Leicester, but likewise to many other towns somewhat similarly situated, we purpose in this paper giving the pith of our investigation into this particular subject.

It has been noted during a series of years, and confirmed by the periodical mortality returns, that the health of the people of this district—so far as zymotic complaints are concerned, and especially Diarrhœa—is in the best condition as a rule during the months from February to April or May, although there are some exceptions that will be mentioned as we proceed. June shows a marked increase in the death rate, July still more so, whilst a maximum rate appears to be reached in August or September; from this time forward there is a gradual decline in the number of Diarrhœal deaths throughout the months from October to January.

Fever, that is prevalent all the year round, seems to follow a different law from the preceding complaint as to periods of greatest intensity. For instance, if in any particular month Diarrhœa is very persistent, as it was

in August of 1868, in September 1869, and in August 1870, and there is a sudden decrease of deaths from this complaint in the succeeding month of each of those years as actually happened, then it is that the greatest developement of fever occurs, suddenly rising to a considerable height, again gradually declining through each successive month down to January or February. There is also usually an augmentation of fever cases about March or April, but in a less degree than the previous period just referred to. And it may be also stated that the fewest deaths from this cause happen in May and June.

The recent Scarlatina epidemic has followed a course again different from either of the first two mentioned disorders. It would appear to have become developed in December of 1869, when there were three deaths, the mortality of the prior eleven months amounting to only five deaths. During the first quarter of 1870, the deaths amounted to fourteen; in the succeeding quarter of April, May, and June there was a sudden calm in the progress of the disease, the deaths amounting to three. July showed a slight increase, and August still higher. In the month of September the deaths rose quickly to thirty-one. The returns again show forty-five deaths in October, seventy-one in November, and eighty-two in December, resulting in a totality of 263 deaths within the year, of which close upon 200 occurred in the latter three months.

For these yearly epidemics various causes have been assigned, none of which, however, appear to us satisfactory. For instance, in respect to zymotic complaints generally, the late Medical Officer of Health of Leicester, in his annual report for 1866, states: "A plentiful supply of pure water is one of the sanitary measures *most* required in the prevention of cholera, as well as in all other zymotic diseases; and the attention of our leading medical authorities, particularly in the metropolis, has been directed to this subject, and it is proved by them that according to the purity or impurity of the water has been to a great extent the amount of disease." "In Leicester the supply of water by the Waterworks Company is both ample and pure."

We may here pause to remark that so far as the first part of this question is concerned, we heartily agree with the reporter; but as to the second part, we are entirely at variance with him, and affirm that the alleged supply is neither ample nor pure, as will be presently shown. The present Medical Officer of Health, in his report of 1867—an exceptionally favourable year—alluding to the few deaths from fever, states:—"Forty deaths from fever in a population of 88,500 inhabitants, speaks

volumes as to the success which has attended the sewerage of the town and the attention which is always being paid to its sanitary condition; and a great deal must also be attributed to the supply of *pure water* supplied to many houses." After referring to the wells of the town being liable to contamination by leaky drains and privy cesspools, proceeds:—"For it is now well understood that both Typhoid Fever and Cholera are propagated as much from impure water contaminated by foecal matter, and containing the germs of these diseases, as from aerial emanations from these agents." The worthy Doctor might also have included Diarrhœa, for it is well known to be produced by impure water, in proof of which we can adduce hundreds of cases. Perhaps the following may suffice:—

The Privy Council's Medical Officer, Dr. Seaton, in his report on Typhoid Fever and Diarrhœa, at Page Green, Tottenham, in 1866, states in allusion to the water supply:—"The way in which people go on unconsciously imbibing Fever and Diarrhœa from such wells as these, is so aptly illustrated by the occurrences at Caines Terrace." * * * "At the five houses of which the terrace consists, all derive their water from two or three surface wells. In the one (No. 5) from which the water was taken for analysis, (described by Dr. Miller as being from sewage infiltration quite unfit for dietetic purposes), Mr. Gaffney has lived for three years; his family consisting of four had all *Diarrhœa* soon after they came." Speaking of the adjoinging house, the reporter says,: "In May, 1865, the present occupant, Mrs. Slack, came; she, her son, and her daughter (the only permanent inmates) had *Diarrhœa* immediately on their coming; the lodgers she has received have each as they came successively had *Diarrhœa*."

"Mrs. Barnes has lived in the next house for two years. They are four in family, and for the first six months of their residence they had nothing but *Fever and Diarrhœa*; lately they have begun to take lodgers, they have had two sets, and each set has had *Diarrhœa*." Speaking of the remaining houses, Dr. Seaton says:—"Of the present occupants, the family residing in one of them, five in number, have all suffered from *Diarrhœa* since they came." "The family residing in the other, and three in number, have not suffered in any way, *but this family boil first all the water which they use for drinking*."

This gentleman concludes his report by showing that "the conclusion appears to me irresistable that the fever and illness (Diarrhœa) at Page Green have been mainly kept up by the use of impure water for drinking."

We think it very conclusive indeed, and call attention to the immunity from attack of the particular family in which the drinking water was boiled, an immunity that we know extends to thousands of instances. Our enquiries into the philosophy of boiling water tend to show a treble action—Firstly—The effect of a boiling temperature is probably to destroy the vitality of the germs of disease contained in the water, or to drive them off with the steam, for they are believed to be very light and volatile.

Secondly—The temperature of steam is sufficient to dissociate the putrid volatile organic bases from the non-putrid substances, and it is due in a great measure to this putrid matter dissolved in the water that renders such water unwholesome for potable usage; the other organic matter which has not arrived at a putrid condition being comparatively innocuous for the moment.

Thirdly—Nearly all natural waters contain Salts of Lime and Magnesia in solution, generally in the condition of Calcic and Magnesic Carbonates—perhaps better understood as Carbonate of Lime and Carbonate of Magnesia—which are dissolved in the water by Carbonic Anhydride, also known as Carbonic Acid gas. Now the affinity between the gas, the water, and the Carbonates is weak, so that when the whole is raised to the temperature of ebulition—as for instance in a tea kettle—the acid gas is gradually driven off, when there remains insufficient for solution of the Carbonates, and these are thrown down or precipitated as a fine powder. The Carbonates—that is the neutral Carbonates—are practically insoluble in water, the particles aggregate upon the sides and bottom of the vessel caking into a hard coherent mass, and is commonly known as the scale, although sometimes it is of a spongy character when sulphates are present.

Now in the act of precipitation the lime and magnesia likewise carry down with them some portion of the organic matter, and this organic matter for our present purpose must be understood as existing in two distinct conditions, viz., in mechanical suspension, hence visible to the eye, and in chemical solution, therefore invisible to the eye. Such portion of the matter suspended falls mechanically, becoming entangled in the heavier powdery crystals of the carbonates.

Some part of the organic matter existing in solution we believe to be likewise carried down by the carbonates, yet after a different mode to the other. In this instance, we take it, combinations occur between the organic matter and the carbonates, true salts resulting at the moment of freedom from solution.

We wish, moreover, to fully impress upon the reader that that part of the impurity of water expelled by boiling during the first ten or fifteen minutes is much more hurtful than that which remains, hence it is a good practice to boil all water of a doubtful quality purposed as a beverage; and we are inclined to include all in this category, respecting which we are not absolutely certain from actual competent chemical examination and enquiry into its source.

The habit of employing boiled water for dietetic purposes is of considerable practice and presumable antiquity, amongst those who are frequently considered of less intelligence than the average of English people.

By way of illustration may be mentioned the inhabitants of many parts of India, certain tribes of North American Indians, and we are further informed, by native Africans of swampy districts. Coming nearer home it is practised by the boatmen on our inland canals. And certainly this is a custom that may be profitably extended.

Putrid organic substances, particularly of animal origin, are known to be exceedingly deleterious when conveyed into the human system even in minute quantity and irrespective of the mode of conveyance, whether by the air that is breathed, water drunk, and the food consumed, or whether introduced directly into the blood through external wounds.

Leicester enjoys peculiar ideas on the causes of its annual diarrhœal epidemics. At the time of a most severe attack, in the autumn of 1868, the Registrar General threw out a broad hint for investigation, by saying that there must exist conditions in Leicester exceptionally favourable to the diffusion of Diarrhœa.

In answer to this challenge, a committee of the Local Board reported that the main causes of the special Diarrhœa mortality were the existence of open privy cesspits in the town, and to the fact of many dwellings being placed upon a damp subsoil; also to the use of impure water, and to domestic ignorance and neglect. With this resolution the responsible officer did not entirely agree; and believed that summer Diarrhœa did *not* arise from zymotic causes. On the contrary, he believed that *simple heat* is the cause of summer Diarrhœa in this country, and in the strong and robust it yields easily to treatment and diet, and that in the children it runs a different and a longer course, and the weak succumb.

That to account for the greater mortality in some towns than in others, the situation and the vigour of the inhabitants are to be considered.

He further "finds it impossible to assent to the theory that a large mortality from Diarrhœa is an evidence of the insanitary state of the town where it has taken place."

Leicester is happy in knowing that the increased number of deaths from Diarrhœa can be fully accounted for, without the hypothesis of a specific cause as generating the disease (vide Officer of Health's report of 1867). It is here noted that Dr. Buchannan observes a great increase in the deaths from Diarrhœa in Leicester since the sanitary works were completed. These operations, be it understood, included sewerage and waterworks.

It is contended that "the increase is not due to any sanitary defects in the town itself, *as obvious* from the acknowledged absence of these defects, and it is proved in other ways, and by a diminution of zymotic diseases generally." We wish at this stage to note that such *obviousness* is not apparent, and deny the absence of defects within and without the town.

In this same report, "It is not denied for a moment when Diarrhœa prevails extensively among adults and persons of mature age, as well as children, that it probably does arise in many instances from sanitary defects ; but that is not the case in Leicester."

And pray why not the case in Leicester? Whence this immunity to a specific cause that is admitted *may* exist elsewhere, and yet not here? How are these increasing yearly Diarrhœal epidemics to be accounted for? The medical officer tells us, "Reference will show that in Leicester at all events it is essentially a disease of children and season, that of 209 deaths, only twenty-one occurred above two years of age ; the deaths below that period amounting to 188, and almost all occurred in the month of September (!) That the deaths from Diarrhœa among adults and even old people, are at *any* season exceptionally small ; and this fact proves most *convincingly* the satisfactory state of the town in a sanitary point of view, instead of the reverse."

On this point we differ from the writer very materially, and maintain it is *convincingly* unsatisfactory that 188 infantile deaths should occur in the short space of about one month!

He "believes that the increase in the deaths from Diarrhœa will be found to depend—in addition to causes first stated—more upon the increase of manufactures, and consequent diversion of a great number of mothers from the congenial occupation of nursing their own children to manufacturing labours, than to any other special cause. ; the natural result of this unnatural proceeding being that the children are fed upon food unsuited to them, that they manifest the pain and injury to their health which it causes by their constant fretfulness and crying, and to

sooth the excitement are dosed with 'Godfrey' or laudanum to keep them quiet."

"Can we wonder that these pallid, emaciated children thus treated—the tone and natural functions of whose digestive organs are utterly destroyed—fall victims to Diarrhœa, easily set up in the increased languor of the system, produced by the heats of autumn days, followed by the chills of autumn nights ; and that in such subjects the most judicious medical treatment is unavailing."

This being put in the interrogative, we answer there has been more than enough of fencing the question on the part of the authorities of Leicester, and it is high time for the people to grapple with the cause of these yearly epidemics that affect the whole population, and sweep off hundreds of its infants to very premature graves. A paltry saving of a couple of thousand pounds to the Borough rates, is no palliation for the suffering and sorrow developed in thousands of homes! Those who are responsible for the health and government of this town have a terrible responsibility resting upon them in respect of these outbreaks, and for their laches in not stamping out, or at least ameliorating the conditions essential for their prevalence.

Nay, it is, perhaps, criminal as concerns the suffering and unnecessary deaths of the people under their government, and uncommercial as regards the pecuniary aspect ; for where can be the gain in a yearly moiety of surplus profits from the Waterworks Company, amounting to about £2000, when there is a direct money loss to the community at large of at least ten times this sum, from the increased funeral and medicinal expenses. The loss of time incurred from inability to work and transact business, due to the prevalent Diarrhœa, afflicting probably more or less half the population, even for the moment leaving aside the other zymotic occasional attacks!

Long consideration and patient research into the subject of this pamphlet prove that the yearly attacks are due to causes that will be presently mentioned, and that such attacks are preventable. When having pointed out the same, it will remain for the people of Leicester, and independently, to continue more minutely and follow up the investigations here broadly conducted by us.

It is for them to determine how long they will so severely suffer from such attacks, and when the same shall terminate ; for we unhesitatingly affirm that the remedy lies to a great extent within their own hands. In common with other Sanitarians, and as long has been shown, we believe

many types of human disease are produced by known specific causes, and that these can be by suitable means greatly ameliorated, if not entirely prevented.

In sporadic and epidemic attacks the causes are not always traced, because sufficiently diligent search is not made; or as often happens, there is a false timidity in local government officers to speak out for fear of consequences where there are so many, and generally powerful interests, whilst those whom they immediately serve are directly concerned in such interests. It not infrequently arises from an idea that matters cannot be mended, that they may aright themselves in time, and so it is useless upsetting the public equanimity. Also coupled with an apathy on the part of said public, who fail to comprehend cause and effect. All of which reasons, whether arising from absolute ignorance or a suppression of knowledge, tend greatly to the disadvantage of the bulk of the people, and as such are reprehensible.

In the early stage of this enquiry some two or three years ago, it was considered probable the causes of diarrhœal epidemics lay within the limits of the town of Leicester itself, for it was represented that the public water supply was of undoubted good quality.

This theory, however, was gradually shaken, for it was noted that the diarrhœal complaint was usually prevalent over the whole town; and not more so—indeed at times less—in crowded, imperfectly ventilated localities, often supplied with water from surface wells; but there were exceptions in this from causes clearly understood at the time.

During the annual diarrhœal attack of 1869, in one week there were thirty-one deaths from this complaint, and it is observed that all were under medical treatment excepting two attended by a medical Botanist. Out of these thirty-one cases, twenty-four of the houses were supplied with water from the Waterworks taps, and the remaining seven cases were supplied from wells. It is estimated that about one-third of the population are supplied from surface wells, the water of a great many is of doubtful quality, whilst some are notoriously bad. Yet, notwithstanding this, it is remarkable there were comparatively so few deaths amongst the consumers of well waters. This is but one instance out of many. Observation shows that the prevalence of diseases vary as the rainfall; some, like diarrhœa, abating with heavy rains, whilst fevers become intensified. Repeated chemical examination of the public water supply reveals the fact of its varying quality. Generally in the spring of the year, in April or May, is the period of its maximum

purity, the time of least contamination from sewage and animal organic matter, and even then it is not a pure and wholesome water. As the year advances the quality decreases, the minimum condition of purity is reached about August or September, by which time, particularly in dry seasons, the water is but little better than diluted and filtered sewage. The maximum of impurity being reached, a reaction sets in, when the water gradually improves in quality throughout the winter months. Thus goes on the same old thing from year to year with little variation, and such as there is coincides with the rainfall. Gradually in the course of examination this became evident, that the quality of the water varied as the rainfall; there is, in fact, a concurrence between them, and as previously stated, there is likewise a concurrence between rainfall and disease. These facts being noted, it became necessary to look a little more closely into the antecedents of the water that is supplied to the people of Leicester, and to determine the grounds of varying quality, and the source of organic and sewage pollution.

The reservoir, with an area of about eighty acres, and gathering grounds comprising some 2700 acres of cultivated country, and over which are spread numerous villages, is situated at Thornton, about ten miles to the west of Leicester. Two small streams, known as the Markfield and Thornton brooks, supply the reservoir, these conveying in time of flood considerable volumes of water; at other times the water is of meagre quantity. The village of Thornton lies abreast of the reservoir, on the apex of a ridge at an elevation of a hundred feet or so about it, in a very insanitary condition, abounding with cesspools, stagnant sewage, defective drains, fever and diarrhœa, together with a polluted water supply derived from the village of Bagworth, a mile away. The greater portion of this drainage decends the hill side towards the reservoir at the base, conveyed in pipes terminating in open ditches, or upon the greensward, whence, beyond doubt, it mingles with the waters of the reservoir. A few yards from the reservoir on the rising slope of the hill is the church and graveyard of Thornton, where are many hundreds of interments; no doubt its drainage, following the law of gravitation, decends to the reservoir beneath, as likewise do the contents of the foul open sewer running by the east wall of the churchyard.

These little streams, and their smaller feeders, run at the bases of several other villages such as Stanton-under-Bardon, Shaw Lane, and the considerable village of Markfield (whose population numbers more than one thousand persons in this latter village alone); presumably much of

the sewage and graveyard drainage of these insanitary places descends into the brooks. Nay, no doubt exists, for we have direct evidence in some instances that the sources of some of the feeders are the public sewers of these elevated villages; notably in the case of Markfield, as we bear witness. Likewise on the banks of the brooks the often loathsome drainage of farm-yards and cottages, with their attendant necessaries, runs directly into the streams.

The various forms of zymotic disease in these villages are typhus, enteric, and scarlatina, whilst diarrhœa and low kinds of fever appear to be permanent residents. The general sanitary arrangements are not good; the water derived from surface wells sunk in their midst, is at least in some instances considerably charged with sewage.

We entered a house at Stanton and enquired for the mother of the family, and were informed that she died some time ago; further enquiry elicited her death was due to typhoid fever. On looking at some of the well water in a tumbler glass it was perceived to be charged with sewage; no chemical analysis was necessary, the evidence was clear; there were disintegrated animal and vegetable remains, its colour was milky from soap suds, the taste and smell were conclusive. It would be no very bold statement to predict that this family cannot long imbibe this filth without incurring the same penalty suffered by the mother. Were anyone so far forgetful of himself as to administer a dose of strychnine to this family, and the fact became known (being a transgression of the law of this land) considerable agitation would doubtless be created throughout the country, every paper would chronicle the details, and the culprit in due course suffer for his misdeeds. Now the results to the family we conceive to be much about the same in either case, whether strychnine or sewage be taken; it is true that the first may act more sharply, although it is equally correct that the effects of the second are at times quite as rapid. At the moment of writing we have such a case before us. The effect upon the public mind is very different; if strychnine is administered, everyone anxiously enquires the particulars; if sewage be partaken of, not even the medical gentleman attending the family hints at such a thing, as if sewaged water were perfectly innocuous. Possibly the relative proportions of frequency may have something to do with this question, for undoubtedly where there is one case of poisoning by strychnine there are thousands from sewage; hence the first being rare creates a sensation, whilst the second is treated with indifference. A village with good water and perfect sanitary arrangements is a *rara avis*, such a one we have yet to discover. Ask at

any village in England if they have good water, and you will be invariably answered "there is none better to be found, sir." Hint at any doubts you may have, when you are met with a smile of incredulity. Let a hamlet lose a score or two of its people from Typhoid or Enteric, and see with what stoical indifference the remainder continue to drink of the water that propagated the disease. We entered a house a little while ago wherein a case of Typhus was reported; it was in one of the villages previously referred to. A cursory observation showed no sanitary defects but the water presented to the eye, to the smell and taste only too sure evidence of its sewagey character. That the husband had imbibed his fever from the water we could not doubt, and we wondered to how many of his neighbours and others the disease would be conveyed, and the distance and time that would be involved in the process. We saw in our mind's eye that the excretal emanations from the afflicted person thrown to the rear of the cottage, gradually descending into the ground, assisted downwards by the daily slops and occasional rains until was reached the water bearing strata beneath but a few yards, from which the village wells are supplied. And this is another of the places from which Leicester derives a portion of its water supply.

The public water supply of Leicester being found of late years inadequate to the requirements of the people, another reservoir has just been constructed near to Bradgate Park, about six miles from the town. Strange as it may appear, nevertheless the fact remains, that no present provision is made for a pure and wholesome water; there is analogous origin, quality, and impurity in the drainage of villages, as in the older reservoir. Notably in the case of Newtown Linford, a considerable village, from which the sewage descends into the brook running through it, and this brook supplies the Bradgate Reservoir. In time of rain the whole stream is tinged of a light brown color, from the rich dark fluid of the farmyards and the sewage mingling with its waters. Also the water from the ditch of the churchyard empties into the brook beneath it. The graveyard is partly surrounded by the brook, whose waters impinging on the east wall, thence flowing along by the side and towards the opposite end of the churchyard enclosure. It hence becomes a question of great importance, and one that ought unquestionably to be solved, whether the drainings from the graveyard do not percolate into the stream which is at a lower level and in such very close proximity. For ourselves, judging by natural laws, and reasoning by analogy, we have little doubt in the matter. Yet, to be strictly just, it is necessary to add that we have not proved there is actual communication between the two.

The Royal Sanitary Commissioners, in their report recently issued, state in reference to water supply and disease :—"Were an extensive analysis of water for domestic use to take place, there is no doubt that many sources now but little suspected would prove to be poisonous or unwholesome, and the prevalence of disease in many districts would be fully accounted for ; for this and other purposes seems eminently desirable." We concur heartily in this suggestion, having known very many instances where disease has been clearly traced to the unsuspected use of impure water. The concurrence between rainfall, impure water supply, and various diseases in Leicester having already been adverted to, little remains for the present to be added upon this branch. The causes of yearly diarrhœal attacks we clearly trace to the impure water supplied whilst a plentiful crop of germs is furnished by the villages before referred to. In the spring, when the water is in best condition there is little disease of this kind affecting the population, as time advances so does the complaint increase, and also the water becomes more and more impure until August or September, when is reached the maximum impurity of water, the maximum dryness of the ground, and the maximum developement of the disease. The cause of variation in the quality of water is this : the sewage of villages is pretty constant, and so probably is that portion which enters the reservoir. By constant we intend the solid material of the sewage, and without reference to the particular conditions of liquidity. Hence the quantity of sewage conveyed by these brooks during equal periods is practically the same, and it follows that the higher the rainfall the greater the volume of water entering them ; also the more diluted becomes the sewage, and consequently the purer the water. Conversely, the less the rainfall the smaller the volume of water conveyed, the sewage matter becomes more concentrated, and therefore the greater impurity of the water. When the seventy or eighty acres of reservoirage is covered as in Spring, there is a large volume of water, and the sewage matters become greatly diluted ; but when the water area is reduced to half a dozen acres, and probably less, as occurs in autumn, with consequent enormous reduction in the volume of water, the sewage and foul matter entering by the brooks, by percolation from the village above, and the fœcal matter of some thirty swans or so kept upon the face of the water to purify it (?) becomes concentrated, causing a greater impurity of water. Frequent analyses have proved the correctness of this reasoning. To the dissolved excrement of the swans is due in a great measure the sea green tint of this water in summer and autumn. It is likewise to be observed

that the foul matter of the water bears varying degrees of hurtfulness, irrespective of mere volume or weight ; the more putrid the matter, the greater its danger when taken into the system with water, and a greater quantity of non-putrid organic matter, presents less risk than a relatively smaller quantity of putrid matter, for the latter acts specifically as a poison. Now an elevated temperature such as summer and autumn heat produces greater decomposition and putridity of organic matter than the cooler temperature of winter and spring, and thus in the autumn we get a more dangerous water.

It will be seen why it happens that heat plays an important part in summer diarrhœa, but its mode of action is very different from that alleged by the Medical Officer of Health of Leicester, as quoted in another portion of this paper. Therefore, the public partaking of these waters suffer according to these varying conditions, and more so in the autumn, for that is the period of greatest organic contamination as well as dangerous stage of such matter. Diarrhœa affects all who partake of this water in a raw state, and in sufficient quantity, by which we mean as it flows from the taps, and without heating or boiling. We believe, as a rule, that infants and children partake of more liquid food than adults in proportion to their weight, and also of more water, for their elders have other draughts with which to quench their thirst. The diarrhœa is general with all ages and classes throughout the town, but the great bulk of deaths occur with the infantile population, from partaking of a greater amount of impurity, and being physically weaker than adults ; from these two causes frequently succumb. When the autumn rains bring floods, and the reservoir again fills, thus diluting the previously concentrated impure water, the epidemic rapidly diminishes. At this period there is a large augmentation of fever cases, and we have no doubt it is due to the accumulation of putrid or semi-putrid organic matter from the sewage deposited in the common sewers during the prior dry summer season, becoming stirred up by the flood waters ; and the sewage gas with the volatile putrid matter thus set free, displaced by the inrushing waters, the one flowing downwards and the gas upwards, entering dwellings and homes wherever there exists defective house drains and improper and imperfect ventilation, poisoning the inmates. A similar action occurs when the spring rains fall, especially with an interval of dry weather. The recent epidemic of scarlatina we attribute to the joint action of impure water and escaping sewage gas ; and although it may be that the disease appeared in Leicester before the neighbouring villages whose sites are on the course

of the brooks before mentioned, but of which, however, we have no proof —it had occurred in them long before becoming serious in the town. And so, by the agency of water, the active principle of the complaint and the germs had every opportunity of getting disseminated throughout the population, and in every direction. Likewise would the sewer gases spread the disease and its germs to all parts of the town, from the emanations of infected persons passing into the sewers. The inhabitants being rendered more susceptible to the complaint from consuming the impurities contained in the water, and we have fairly conclusive proof that such was so in a few cases enquired into. The autumn rains also assist in creating an intensified epidemic, by setting free and displacing large volumes of sewage gas.

Advertence having just been made to the sewer gases being likewise concerned in disseminating and intensifying zymotic disease, it is perhaps necessary to refer to the mode of action. In the first place it is as well to point out the system of drainage adopted in Leicester, so that our remarks may be rendered as clear as practicable to those who may be unacquainted with this somewhat intricate subject. It is now about eighteen years since the deep sewers were constructed on a very constricted scale, and at depths below the street surface of from six or eight to twelve or fifteen feet, varying with the localities and contour of the ground. These sewers, with their tributary branches and drains, commencing at all parts of the town and suburbs gradually converge to one point, joining at a distance of a mile or so from the central parts of the town on a piece of ground known as the meadow, and adjacent to the sluggish river Soar. The sewage having gravitated from every district now passes in a body through a main trunk sewer under the river, and into what are well known as the Leicester Sewage Works, where some years ago were manufactured the celebrated *Leicester Bricks*—more of this presently. The drainage of the town prior to the new works being carried out consisted of flat shallow drains, which emptied their contents generally into the river, canal, or other water courses, and likewise of a considerable number of privy cesspits, many of which latter yet remain to the indelible disgrace of the authorities; and when these are emptied during the night or early morning into huge lumbering open wagons, the effluvia spreads with telling force in every direction, rendering the air not only loathsome and disgusting, but positively dangerous to be breathed. The risk is not confined to the locality of each cesspit emptied, but is incurred wherever the wagon goes on its journey through the town, and the smells are very perceptible long after its passage

from the leakage that falls in the streets. We have often thought that *Punch's* remedy for the prevention of railway collisions, by setting a *Director* upon each buffer of the engine, might advantageously be employed with a slight transposition—for instance, to set a stout *Alderman* and attenuated *Councillor* upon each shaft of the wagon during the process of filling with the contents of cesspits would, doubtless, prove speedily effectual in abating the nuisance. The ancient drains yet remain, and in some instances do duty as sewers, but generally they act as relieves to the deeper sewers, by receiving the storm waters from the streets in wet weather; moreover, retaining the heavier street detritus, that is more conveniently removed from these shallow drains than from the deep ones into which they ultimately enter with the flood waters. These old drains are very ramified, and spread over the whole town in an extraordinary manner, and are productive of no little injury to the inhabitants under whose houses they frequently pass.

The whole of the sewerage system, both ancient and modern, being closely connected and ramifying in every direction (in the case of the former sometimes in localities where they are little suspected), it will be readily understood that the sewer gases flow to every part of the town with great facility; and it must be known that the sewers of Leicester generate a vast quantity of gas, primarily due to the defective condition of many of them and their flat gradients, whereby the flow of sewage is retarded, and considerable quantities of the suspended organic matter gradually becomes attached to the sides and inverts of the sewers, slowly choking them. This matter decomposing, fills the subterranean passages with gas and volatile organic bases, and be it understood that this gas flows in a direction opposite to that in which the aqueous sewage is travelling, so when the sewage descends the gas ascends. By this law excretal and other sewage matter—at least the volatile portion of it, and it is nearly all volatile at some period—may be conveniently transmitted to any portion of a town, no matter how distant from the place of original conveyance to the sewer, nor whether at a considerable elevation or lying in a valley; because the gas will ascend to the elevated positions, and the fluid descend into the hollows. This being understood, it follows that great necessity is implied for due ventilation of these sewers, so that the gaseous products of decomposition may be conveyed away to the external air as rapidly as possible; and to render them yet more perfect there should even be provision for letting in fresh air at the lower positions. By due ventilation we must explain is intended proper ventilation of every part of the drain-

age system considered as a whole, and not ventilation of particular places, fixed upon indescriminately, simply because certain factory chimnies or other convenient modes of ventilation are at hand. A dozen such ventilators in any one district will be of no material benefit to an adjacent district or system; in a word, each single sewer or drain must have its own perfect ventilation. And unless this is actually the case no town sewerage can be considered satisfactory.

Proceeding a little further, in periods of heavy rains and floods, unusual quantities of gas are produced; in the first instance each given volume of water entering the sewers displaces an equal volume of gas, and, secondly, as the waters rush through the sewers with accelerated velocity, the accumulated foul deposits on the sides and inverts are agitated, which operation sets free a great volume of gas previously contained in the deposits. Hence, efficient ventilation during floods is of the first consequence; in reality, proper ventilation of sewers is of quite as much sanitary importance to a town as the sewers. High winds, and winds blowing from certain quarters, such as the north and east, are disturbing elements to the sewers in the absence of proper ventilation; indeed we have noted greater pressure within the sewers during these winds, and in dry weather, than in periods of floods. The reasons of this are not quite obvious, but it is just possible that the change in barometric pressure in the case of a high wind may be the cause; and in the example of an east or northerly wind it may be due to the aqueous saturated and warm air of the sewers rushing to meet the dry cold air blowing from the direction just indicated. We have noted the pressure to be greatest when the wind is a high one, and blows from the east or north; this would be accounted for by such air being both rarified, dry, and cold. It will be observed that when the sewers are imperfectly ventilated internal pressure is created, and the gas being very subtle and penetrating will pass through the merest crevice conceivable when the sinks and grate traps are perfect; and when these are, as usually happens, imperfect, or the drain pipes are broken, improperly laid, possibly disjointed, brickwork decayed, joints without mortar, mortar rotten, and the thousand and one mishaps that are found in house drains, there the gas often issues with astonishing velocity, frequently a small hole in a pipe or brick emits gas enough to extinguish a lighted match or candle in a moment. Therefore, ventilation in sewers is essential, because the gas *will* otherwise enter houses, notwithstanding the *usual* precautions taken to keep it out; and it is somewhat remarkable that these escapes happen in many houses—

evidently a great many—without apparently the inmates being at all aware of the fact, indeed we almost daily observe it. Presumably this can only arise from innocence of the pernicious effects following the breathing of this foul gas, especially at night, coupled with the fact of constant exposure blunting the usual organs of perception.

Now in the absence of ventilation, zymotic disease and epidemics are spread through a town, because the complaint once introduced, the natural evacuations of the afflicted pass into the sewers, conveying great numbers of germs, and as the mode in which the aqueous and gaseous sewage is distributed has been already discussed, it will be at once perceived that the seeds and germs of epidemics are disseminated in a similar manner. Having reasoned thus far, it is necessary to inquire into the provisions made for effective ventilation of the Leicester sewers. In the aggregate there are a great number of ventilators promiscuously scattered over the town; most efficient many of them undoubtedly are. We can indeed conceive nothing better for the intended purpose than the tall chimney of a manufactory; these perform excellent duty in the particular sewers to which they are attached, and those manufacturers and others granting the use of their stacks for ventilation are conferring a much greater benefit upon the locality than so simple an action would appear to convey. On the other hand there are whole districts without any ventilation whatever, other than that finding a vent into the houses of the people, and similar extraneous and improper modes. It would be invidious to mention localities, still it is notorious there are districts in Leicester wherein the recent epidemic of scarlatina was most persistent, and families were swept off. The causes we have already treated upon, and need not repeat; it will suffice when we say that these afflictions were due to impure water, and impure air from the plentiful escape of deleterious sewage gas into the houses, and of this we have no earthly doubt. But whose is the blame? For to attribute these deaths to the act of God we conceive to be about as wicked and improper as to attribute to him the doings of the drunkard or thief.

The sewage, averaging in bulk from four to five million gallons per diem, having arrived at the works by gravity, is in ordinary times pumped into large tanks, and on its passage treated with caustic lime, for the purpose as originally intended of precipitating the stercoraceous properties of the sewage, and for purification; but in both these objects the process entirely fails. The manurial matters are only precipitated to a small extent, and the purification is practically *nil*. The reaction that takes place is this: when the caustic lime is mixed with sewage, the

latter holding in solution considerable quantities of calcic and magnesic bi-carbonates, one equivalent of the carbonic anhydride is disengaged from the bi-carbonates, combining with the caustic lime, two equivalents of hydrated neutral carbonates resulting, and an excess of caustic lime always remains in solution. These carbonates are very flaky, and of somewhat gelatinous consistency, that gradually fall to the bottom of the tanks, carrying down with them some portion of the suspended particles of the sewage. The soluble portion of the sewage is scarcely any, if indeed at all interfered with; and when our readers are aware that the soluble substances are present in six or eight times greater quantity than the suspended portion (that which is visible), it is clear that the purification of the sewage is very incomplete—in fact scarcely commenced. Even the small part precipitated by the lime does not long remain there, for decomposition of the organic matter sets in, rapidly accelerated by the caustic alkaline state of the substance and surrounding fluid, so that the ascending gases (being products of decomposition) counteract the effects of gravity. In fine the whole is kept in an agitated state, and so the sewage ultimately passes from the tanks into the river in very much the same state in which it entered; true it is rather more decomposed, which cannot be a recommendation.

Now the wholesale daily discharge of such large volumes of sewage into a slow and sluggish stream necessarily results in ruining the river, of which any one whose olfactory organs are sufficiently fortified may be easily convinced by walking for a mile or two along its course, particularly a month or two hence. The effect of this wholesale poisoning is very serious upon the health of those who unfortunately dwell near to the river, and in the numerous villages and hamlets adjacent. No doubt this relic of barbarism has nearly ran its final course, and we need not dwell. No suggestions for improvement in this matter are necessary, for the town has recently been ably advised. We can only add that the Leicester process for treating sewage is the worst in every respect, whether of cost or results, of a considerable number investigated by us. Having pointed out in the course of these pages the evils from which Leicester derives her zymotic epidemics, and indeed sporadic attacks as well, the remedial measures must be self evident. These remedies, which must be sharp ones, lie with the inhabitants of Leicester themselves, who are yearly affected by these yearly outbreaks, for there is probability of another occurring ere long of a kind different from any that have recently afflicted them. We refer to small-pox; for after its appearance in any of the

villages performing the functions of nurseries of disease to Leicester, no lengthy immunity can be reasonably expected. We are informed the disease has appeared at Markfield. As concerns the impure water the impurity must be ejected, no pollution allowed access into the streams, feeders, and reservoirs, from the numerous points of present collection. In the case of Thornton village, as it rests upon the ridge of a hill, its sewage must be diverted upon the opposite slope, instead of running down towards the reservoir. At the base of the sloping ground, near the edge of the reservoir, a deep channel may be cut to intercept all village drainage and the graveyard percolations, a few yards off. But unless carried well below the water level it will be quite useless. The other villages ought to be similarly treated, and wherever the contour of the country will not admit of better means, gravity must be overcome by suitable appliances. When this is done, and the *sewage* removed, there will still remain quite sufficient impurity in the water from the drainage of six thousand acres of cultivated country comprising the gathering grounds.

The sewers of Leicester require thorough and efficient ventilation in every direction, not a single drain must be left without it; every care being adopted of making the ventilating media thoroughly air tight, with proper exits at the top. These should be of sufficient elevation, and away from windows and chimnies, for the latter in warm weather, in the absence of fires, cause down draughts. There is no necessity for pursuing the subject further. The remedies are so extremely simple, we can only wonder they have been so long neglected.

One word more. Pending the introduction of a perfect ventilating system, the sanitary authority—the courteous reader will be pleased to excuse the incongruous phrase—will be wise in their generation if they were to put less water into the gulley traps of the broad and main thoroughfares of the town, and more of it, and more frequently, into those of narrow and confined localities; for to a close observer the present practice savours somewhat of the whited sepulchre.

So let Leicester beware! We wish the people a God speed in the improvements that are so much needed, and that can be executed at such comparatively little cost, for where the causes of zymotic disease are known, and are pointed out, the remedies become simple and unerring, and that the true causes of Leicester's yearly epidemics are those pointed out in this little pamphlet there can be no reasonable doubt—we have none. We clearly admit the existence of others that bear a certain portion of blame, such as dwellings erected upon made ground; this ground containing more or less garbage

thrown in with the soil and *debris* to fill up the hollows. It is true there is not much of this in Leicester as compared with some other towns, but probably sufficient to account for occasional sporadic fever cases in these particular localities, more especially when wells are sunk through the made ground, and the garbage gradually becomes dissolved and carried down into the wells. We have recently examined the waters of a number of wells in a certain district of Leicester, belonging to houses erected upon made ground, at whose base there lies a substratum of very porous gravel and sand. These waters when submitted to analysis were found identical in composition, and contained a like amount and the same description of impurity, notwithstanding some of the wells are a considerable distance apart. The water of these wells is not good, and is below an average quality, yet the people appear to imbibe it without visible detriment. Nevertheless, a considerable risk is incurred, for it is exceedingly probable that the inhabitants will suffer eventually, should there be from any cause a concentration of organic impurity, which may easily arise from the stoppage of a local drain or sewer, when the sewage matter percolates the unmortared joints of the sewer crown. With a porous subsoil, like coarse gravel and sand, sewage contamination may be conveyed considerable distances, because the act of drawing water from wells disturbs the subsoil water level, thus setting in motion currents in various directions.

The depravity and neglect of families in certain portions of the population likewise tends to aggravate diseases; but upon due consideration and careful investigation, we are not disposed to attach much weight to this, for these classes are by no means the heaviest sufferers from epidemics.

One additional cause must be mentioned that is not confined to any particular class or division of the people, and therefore more general in its action; it is one to which little importance is usually given, we think erroneously. It is the adulteration of food, both liquid and solid, particularly the former, which practice is somewhat extensive. Of course epidemics are not caused by sophisticated food; but the more delicate children and weaker adults are thereby rendered more susceptible to their influence, and likewise the tone of the general health of the population correspondingly lowered. Indeed, that isolated cases of zymotic attacks do occur through the agency of adulteration there can be no doubt; we have noted several such instances. But after all, this turns upon the primary question discussed in this paper; what has been described is but adulteration upon a grand scale. IMPURE WATER, IMPURE AIR, AND IMPURE FOOD are very synonymous terms, and often, too often indeed, arise out of each other. The whole may be well included in one word, and that is "ADULTERATION."

THE NEW PROCESS

FOR THE

PRESERVATION OF MEAT

FOR FOOD,

By J. MORGAN, F.R.C.S.I.,

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1865.

The following pages will, I trust, serve to direct attention to a subject hitherto strangely neglected, yet of the greatest importance both with regard to the health and efficiency of the seaman and soldier, and to the financial question of the preservation of meat for food, as shown by the subjoined comparative outline:

BY THE METHOD NOW IN USE.	BY THE NEW PROCESS.
In the rubbing and laying in salt the meat is deprived of its nutritive qualities to the extent of one-third (according to the calculation of so eminent an authority as Baron Liebig*); so that, apart from the injury done by the absence of these qualities, the financial loss is enormous—in a single curing season amounting to £25,000, or one-third the cost of 5,000 oxen, producing 5 cwt. of meat each, at £3 per cwt.	There is no rubbing or laying in salt, and therefore no abstraction of nutritive materials or financial loss.
The meat is then packed in salt and brine, and a further abstraction of the nutritive and essential elements thus takes place, proportioned to the length of time in cask.	An entire ox can be preserved in ten minutes, and as the materials used remain in the flesh, even they become a source of profit.
When thus injured and rendered difficult of digestion by being hardened, the meat can only be prepared for the table by boiling, any remaining soluble elements being thus as far as possible taken away and rejected.	The flesh is put to dry as soon as convenient, and when dried, is packed in barrels or cases with sawdust or some dry material, and is therefore more portable than by any other method.
In consequence, a further expense is incurred in endeavouring to supply the natural elements taken away, by using lemon juice, &c.	The meat can be eaten either uncooked, or as beefsteaks, roasts, hashes, soup, &c., thus admitting of a suitable nutriment for invalids, and also of variety.
From the necessity of curing in the winter season, the price of the meat is considerably raised, and a large quantity of stores must be prepared at the same time.	The elements of vegetables as anticorbutics can be artificially added to the flesh, thus presenting meat and vegetable at the same time.
	Wherever a ship touches and at all seasons meat can be prepared for stores on the spot with great economy.
	The apparatus necessary for preserving any number of animals is portable by one man, and costs but a few shillings. No special machinery or building is necessary.

* *Letters on Chemistry*, p. 448.

THE NEW PROCESS
FOR THE
PRESERVATION OF MEAT FOR FOOD.

The subject of the Preservation of Food, particularly of flesh food, has lately attracted so much attention in a hygienic point of view, and such various means have been practised to arrive at a suitable mode of effecting this object, that it becomes a question of great interest and importance,—and just now attracts a well-merited share of attention.

To a nation with such a navy, merchant marine, and military force, the great significance of the subject cannot be over-estimated—not only in its *scientific*, but in its *financial* point of view; for where the supply of flesh food for so many thousands of men is concerned, the first consideration which should, *as a duty*, be entertained is, how far the means adopted are capable of securing preserved meat *in a perfect condition*, with regard to *composition*,—and, secondly, how far the material produced is at all *commensurate in perfection with the cost*. I would propose, briefly, to enquire if these conditions are fulfilled by the present means, and if the usual processes cannot be improved or superseded by that introduced by me to the notice of government, as a *scientifically correct* and *mechanically convenient* method, possessing all the requisites for securing perfect results, and adapted to meet any emergencies that may arise, as during the late Crimean war, when the defects not only of the supply but of the quality of the meat for food, were so evident and gave origin to such wide spread mischief, as shown by the statistics that, from October, 1854, to April, 1855, with a healthy climate and a stationary army, the rate of disease rose to the alarming amount of 39 per cent. for the infantry, and 45 per cent. for the troops in the front—

and the proportion of those lost by sickness to those by wounds was, if we take the whole war, as 16·211 to 1·761. That this high rate of ill health was owing chiefly to the imperfect food is admitted by all. It has been aptly remarked,* "If we were asked to prescribe a dietary best adapted to give rise to gastric irritation and dyscrasial disease, could we suggest one more potent than salt pork, hard biscuit, and raw rum?" But if, in addition, we find that this meat could have little or no nutriment, that its most important constituents are taken from it in the process of "cure" and packing, that it is rendered more difficult of digestion, and it no longer contains any of the natural elements suited for the maintenance of health, we may fully understand the speedy appearance of the "great destructive agent scurvy," and the truth of Dr. Macleod's remark † that "this scurvy was our worst enemy and wrested from us more wounded men than even the conical ball."

It is plain that the meats preserved for stores should not only be capable of preparation in as economic a form as possible, and of easy portability and transport, but that they should be in a suitable condition for replacing the wants and supplying the nutritive elements necessary to perfect health. For the sailor this is imperative, who, while exposed to the vicissitudes of weather and temperature, and undergoing frequent and often prolonged exertion, must, at the same time, be supported on a more or less artificial diet, with but little vegetable supply, or even (by the present method), of the *natural* supply contained in flesh originally obtained from the vegetable kingdom; for it has been too much the habit to consider the mere fact of "*cure*" as the sole object to be gained—forgetting that meat may be so preserved with but *little, if any*, nutritive power, and, still worse, be served out as food, representing nutrition. For, to use the words of the most unquestioned authority—Baron Liebig—who has so fully treated of the subject: "It is obvious that if flesh employed as food is again to become flesh in the body, if it is to retain the power of reproducing itself in its original

* *Macleod's Surgery of the Crimean War, p. 26.* † *Ib. p. 71.*

condition, none of the constituents of raw flesh ought to be withdrawn from it during the preparation of food. If its composition be altered in any way, if one of the constituents be removed, a corresponding variation must take place in the power of that piece of flesh, to resume in the living body the original form and quality on which its properties in the living organism depends."*

Therefore, it is a matter of primary importance that the meat should retain the *natural elements sufficient for perfect health*, even without the addition of vegetables, as sufficiently proved by the well-known illustration of carnivorous animals, who derive the requisite vegetable elements from the flesh of the herbivorous animals on which they prey; while, amongst mankind, the fact that the inhabitants of the Pampas, the North American hunting tribes, and the Esquimaux, who are only flesh-eaters, enjoy perfect health, shows the sufficiency of flesh in its *perfection* for sustaining existence, where, either from inability to obtain, or from habit, vegetable food is not used. It is not convenient here to refer to the question of the necessity or advantages of flesh diet, or to notice the superiority in bodily endurance and mental activity of the flesh, over the vegetable eating nations, to shew that the thinking mind and working body are equally influenced by the perfection and quality of food. "The commonest observations," says Liebig, "teach us that flesh possesses a greater nutritive power than all other kinds of food." "It is certain that three men—*one* of whom has had a full meal of beef and bread,—the *second*, of cheese or salt fish—and the *third*, of potatoes, regard a difficulty which presents itself from entirely different points of view, the effect of the different articles of food on the brain and nervous system is different, according to certain constituents peculiar to each of these forms of food."† So that, taking a scientific view of the necessity of a proper supply of flesh materials, it becomes not merely a matter of individual interest, but, for the army and navy, a *serious duty* to enquire how far the soldier or sailor is furnished with a substance capable of fulfilling its proper office of *supplying the wants of the*

* *Leibig's Letters on Chemistry, p. 467.*
† *Chemistry of Food, p. 122.*

system. The necessity of such has been too often proved in warfare—the meat, even if enough in quantity, or rather *bulk*, being deficient in quality and nutritive power. Consequently, the failure of the physical and moral powers follows, and, as illustrated by the above quoted remark of Liebig, there is neither the mental activity to project, nor the ability and energy to accomplish, important measures under circumstances where these qualities are particularly required. Dr. Macleod, in his "*Notes on the Surgery of the War in the Crimea*," observes:—"The constant repetition of the same rations, the absolute uniformity in every item of food, is but too apt to occasion aversion, especially with those in whom disease is beginning to show itself. I can speak from personal experience as to the strong predisposition of this one cause in giving rise to the fever designated 'Crimean,' and I know of few things which had a more undoubted effect on the health of the troops."

In the first place it is necessary, in order to understand rightly the objects to be attained, that the composition of flesh and its various constituents, with their uses in the animal economy, should be referred to. It may be stated in general terms, that flesh contains per cent. of *water* 76 *to* 79; of *albumen*, 2 *to* 14; of *fibrine*, 17 *to* 18; that, on an average, in ten pounds of flesh the soluble matter, after coagulation of the albumen and coloring material, does *not amount to three ounces*. The very smallness of these matters shews the great necessity of retaining them, except the water, intact in the flesh, which consists of—

1. Water.
2. Albumen.
3. Fibrine.
4. Phosphoric Acid.
5. Lactic Acid.
6. Potash, Phosphate.
7. Potassium, Chloride.
8. Kreatin.
9. Kreatinin.
10. Inosinic Acid, &c.

Ashes of Flesh (after Keller).

Phosphoric Acid . .	36·60
Potash	40·20
Earths and Oxide of Iron .	5·69
Sulphuric Acid . . .	2·95
Chloride of Potassium .	14·81
	100·25

It will be now convenient and useful to allude to each of these constituents separately, with reference to their office in the animal economy.

1. *Water*, which is so constant a constituent of the body, varies in different kinds of flesh, and with the age of the animal—but always forms a large proportion, three-fourths, or more. It is evident that this element can be harmlessly dispensed with, as it can be always added artificially in the preparing of food—but is useless, as well as inconvenient for transport—occupying unnecessary space and increasing weight, while it is ever ready to facilitate decomposition.

2. *Albumen*, as contained in a state of solution in the juice of muscle, surrounds and bathes all the muscular fibres, and is found in varying proportion. It supplies, as food, the basis from which the structures of the body are formed. "Everywhere throughout organized nature where animal life is developed, we find the phenomena of life depending on albumen."* The familiar example of the composition of the egg shews how, with merely the assistance of external air admitted through the shell, all the complex structures of the body of the chick are fully formed, and its organs perfected for supporting an independent existence on emerging from the shell. Albumen is the "starting point" of the whole series of tissues. *The necessity for retaining* this material in flesh is therefore obvious. It is on the abundance of this albuminous fluid, and its retention in the meat, that the tenderness depends; hence the rule in good cookery, of either plunging meat at once into boiling water, or putting it close to the fire at first, to make a crust of coagulated albumen, and so retain its juices. The coagulation of the albuminous substance around the fibres prevents their hardening and contraction.

As the albuminous matter is deficient in the flesh of old animals, it accounts for the toughness of the meat. If flesh be mechanically prepared, by depriving it of the albumen, the fibre becomes hard and horny, and therefore difficult of digestion.

By the method of "cure" at present in use, the greater part of this highly nutritious albumen is abstracted, and merely used for "fining" or cleaning the pickle that is withdrawn from the pickling tanks. It is calculated that

* *Liebig's Letters on Chemistry*, p. 371.

in Glasgow alone, albumen equal to 187 tons of meat is lost per winter, which, at 6d. per pound, equals a loss of £10,472 worth of nutritious material. What the loss on a large scale is, may be conceived.

3. *Fibrine*, which forms 17 to 18 per cent. of flesh, and about 70 per cent. of the flesh when *dried*, is, in a chemical view, analogous to albumen, and in the same relation to the albumen of the blood as solid and fluid albumen would be. In the process of digestion it is softened and dissolved, as is the boiled, *i.e.*, congulated white of egg. If the fibrine when long boiled be examined after the formation of soup, it is found hard and difficult of digestion.

By the method of "cure" at present used, the fibrine is the principal residue, becoming of course hard, and in a little time so hard as to require a saw or chopper instead of a knife—no doubt the material in this state is not liable to decompose, and on this account hardness is looked on as one of the tests of good "cure"—unfortunately at the same time being a *test of deterioration in quality and inaptitude for food.*

These materials of meat, though popularly believed to be the essentials, are *of themselves incapable of supporting the vital process;* some other compounds, as tabulated above, are requisite. The well-known efficacy of soup in restoring strength to the body and perfection to the digestive process, (though this soup does not contain the fibrine of the meat,) and the inutility and vapidness of the meat after its preparation, are every-day striking though unobserved proofs. Analysis, however, bears out experience on this point.

* When boiled there enter the soup		and remain in the exhausted meat
Phosphoric Acid . .	26·24 . .	10·36
Potash	35·42 . .	4·78
Earths and Iron . .	3·15 . .	2·54
Sulphuric Acid . .	2·95 . .	
Chloride of Potassium .	14·81	
	† 82·57	17·68

* *Liebig's Letters on Chemistry, p.* 446.

† The usual process of "cure" abstracts these elements even more thoroughly than in making soup. See page 15.

Two converse experiments performed by the Gelatine Commission in France, (see *Rapport à l'academié des Sciences*, August 2nd, 1841,) and giving its results after continuing experiments for *ten years*, show the importance of these other constituents of flesh. A dog was fed daily with half a pound of boiled flesh softened in water, *thoroughly expressed*, and freed from fat as much as possible, but lost, in the course of forty-three days, a fourth of its weight; after fifty-five days his emaciation was extreme; he could hardly eat the quarter of his ration, and his utter exhaustion was evident to the eye. On the other hand, dogs fed with the same amount of raw flesh, which, of course, contained more water and less meat, continued healthy. The converse results were obtained thus:—

A young dog (female) was for some time fed on bread and gelatine. She had lost one-third of her weight, was excessively weak, and about to die. *Four table-spoonfuls of soup* were now added to each mess, and from that time the animal regained strength.

These experiments, amongst many, show the great necessity of those other compounds, though contained but in small quantity. We may, therefore, further inquire into their composition and objects, premising that "Flesh contains in its composition certain universal conditions of digestion and nutrition, in regard to which other kinds of animal and vegetable food resemble it. In its fibrine and albumen it has a definite value for the production of the fibrine and albumen of blood; in its fat, a value for the production of heat; and in its salts, a value for the production of both heat and blood, as well as for the secretory processes. In addition to these, flesh possesses, in the very remarkable constituents of the juice, *a peculiar value* for certain processes of a higher order, by which it is distinguished from all other forms of food."*

4. *Phosphoric Acid* is contained largely in the juice of flesh, and found in different chemical forms, amongst others of "meta phosphoric," (which I propose, as will be seen by-and-by, to add by my process, being in

* *Liebig's Letters on Chemistry, p.* 448.

this form recommended by Professor Galloway of Dublin.) From the constancy of its occurrence, not only in flesh, but in other substances of food, especially from the vegetable kingdom, its office has been particularly enquired into. We find it forming in usual articles of food, as

In ashes of Ox flesh	. . .	36·60 per cent.
„ Salt Cod fish	. .	16·775 „
„ Yolk of Egg	. .	36·74 „
„ Cheese, Gruyere	.	45·00 „
„ Tea (Souchong)	.	9·88 „
In Wheat	. . from 40 to 60·00	„

In the Ashes of Wheat.

Alkaline Phosphates	. . .	49·18 per cent.
Earthy Phosphates	. . .	23·13 „
Free Phosphoric Acid	. . .	27·69 „
		100·00

Though its exact properties cannot be defined in all cases, yet, from the constancy of its occurrence, we may see it is "indispensable to the vital process."* As it is found largely in flesh-juice, it is necessary to the normal state of the muscles of animal and organic life. It is a constituent of the viscera, liver, lungs, kidneys, &c., and of nervous matter; but in the latter is deficient in childhood, old age, and idiotcy, therefore essential to the composition and perfection of the brain. It is also contained in the gastric juice, explaining the advantage of soup to stomachs of low digestive powers, thus not only supplying the wants of the body, but the gastric fluid itself. Other, and if possible more important offices, are to be fulfilled with regard to the blood by this acid. If we reflect for a moment that the blood, which is so freely distributed to every minute and remote part of the body, is contained in capillaries of extraordinary and even microscopic minuteness, we may conceive of what tenuity must be their walls, and how much more permeable than blotting paper, and yet these minute vessels, though immersed in a fluid muscle-juice, do not allow the filtration of one of these fluids into the other;

* *Liebig's Letters on Chemistry*, 490.

nevertheless, the explanation as proposed by Liebig is simple; for, as the contained fluid, blood, is alkaline, and the muscle-juice surrounding, acid, the necessary conditions of an electric nature exist for preventing the interchange of these fluids. In correspondence with this idea, Professor Buff constructed a pile, consisting of discs of pasteboard moistened with blood, of flesh, and of brain. This arrangement caused a very powerful deviation of the needle of the galvanometer, indicating a current in the direction from the blood to the muscle. When water was substituted for brain, the action was weaker; the current arising from contact of blood alone with the platinum was in this case the reverse.*

The alkalinity of blood is owing to the phosphate of soda which is "indispensable to its normal constitution." As it has the peculiar and wonderful property of conveying carbonic acid in large quantity, and when, having given it off in respiration, still retaining its original properties, "the serum of blood absorbs 166 times more carbonic acid than could be absorbed by the very largest proportion of carbonate of soda which it can be supposed to contain;" and "there is no known salt the chemical properties of which approach more closely to those of the serum of the blood than the phosphate of soda. There is none more fitted for the absorption and entire removal from the organism of carbonic acid."† The necessity of this compound of soda in the blood is proved by the eagerness with which animals living on *inland* plants, which *contain potash largely*, but not *soda*, impelled by a natural instinct, seek the "salt licks" and other means of obtaining salt (chloride of sodium). By the action of chloride of sodium on phosphate of potash we have the phosphate of soda supply found so necessary to the blood, and chloride of potassium for the muscle-juice. We find, therefore, phosphoric acid in some form everywhere necessary, specially to blood, gastric juice, and muscle, and serving in the great processes on which life depends—of circulation, animal heat, digestion, &c. As it is supplied in flesh in comparatively small quantity, great care should be taken to re-

* *Liebig's Chemistry of Food*, p. 104. † *Ib.* 117.

tain it, or even to make an artificial addition in certain circumstances of living, and where there is no vegetable supply obtainable.

By the present means of "cure" this material, as in the soup above referred to, is abstracted by the brine.*

5. *Lactic Acid* is another ingredient of perfect meat, and is found to be identical with that formed in sour milk, or by the decomposition of sugar, starch, &c. The acidity of flesh is in a great measure due to this acid, between which and phosphoric there is an equilibrium maintained. It is consumed in respiration, and is, therefore, a former of animal heat. When added in quantity to food it does not pass off by the kidneys, but disappears in the system, as shown by experiments.† "It plainly appears, therefore, that the lactic acid in the organism is employed to support the respiratory process; and the function performed by sugar, starch, and in general all those substances which, in contact with animal matter, are convertible into lactic *acid, ceases to be an hypothesis.* The presence or addition of lactic acid heightens the flavour of meat. Again, it is also contained in the gastric juice, as one of its natural constituents"‡

By the present process of "cure" this lactic acid is abstracted, thus doing not only positive harm, by denying it to the gastric juice, but a negative one, in taking away so much natural aliment and carbon supply for respiration.

6. *Potash salts*, as seen by the analyses referred to above, are largely contained—

	In Ash of Flesh.		*In Soup.*
Potash	40·20	. .	35·42
Chloride of Potassium .	14·81	. .	14·81
In Raw Beef—Potash .	9·599 } per ounce.		
In Salted „ — „ . .	0·394 }		

Their uses having been before incidentally explained, it is only necessary to remark their quantity and obvious importance. These components are removed also by the process of salting,§ and the occurrence of scurvy has been

* *Liebig's Chemistry of Food, p.* 135. † *Ib. p.* 103.
‡ *Ib. p.* 138. § *Ib. p.* 135.

attributed to, and no doubt is, to some extent, owing to their absence.*

Certain other crystallisable constituents have been determined by the researches of Liebig, such as kreatin, kreatinin, sarcosine, inosinic, (or the flavoring) acid of flesh, &c. These must be more or less destroyed by the ordinary "curing process."

Gelatine, usually supposed to be contained largely in flesh, though present in tendon, bones, &c., forms but a very small, and might be called accidental portion—in veal, not 1·578 per cent.; in beef, 0·6 per cent. Contrary to general belief, it is altogether *innutritious;* and here it may be well to refer to this very popular idea of the nutritive value of gelatine, as the latter substance is often supplied and purchased at a high rate for stores, either by itself in cases, or forming a large proportion, in weight and substance, of the tins of preserved meats, and served out to the men as food, and that of a non-nutritious quality, involving waste of money, space, and carriage, and still worse, being generally reserved for the sick comforts, is supplied at a high rate, *with injury instead of benefit.* The Gelatine Commission of Paris, under Magendie, 1841, pursued a series of experiments for a space of ten years, on gelatine made from Holland broth, bones, &c., and by different modes. Gelatine soup in abundance was supplied as long as the dogs, subjects of the experiments, would eat it; but by-and-by they refused, and though living amidst abundance of this soup, died of hunger, and in the same time as dogs of same weights, &c., who ate *nothing.* Again, dogs supplied with water and *no* food lived six, eight, or ten days longer than those supplied with gelatine only. But the instance of M. Jules Lecœur, who voluntarily went through a series of these experiments, is most complete. On the 22nd June, 1842, he took at mid-day *thirty-five* ounces of gelatine, and three and a-half ounces of bread. He was more "*saturé que rassasié*"—more filled than satisfied; he felt uncomfortable, and was very thirsty. At three o'clock was hungry; at six he took twenty-eight ounces

* Dr. Garrod.

of gelatine and three and a-half ounces of bread; he felt more uneasy than before, was tormented with hunger in an hour, and at ten that evening, to satisfy his appetite, had to eat fifteen ounces of bread, though he had consumed within ten hours the product of *thirty litres of bone broth*—about twenty-five quarts. So he continued for four days of experiments, suffering daily more uneasiness, having severe dyspeptic symptoms, perspiring much, and feeling weak. M. Donné also experimented on himself. After six days subsistence on gelatine, during which he suffered much from hunger, he had lost two pounds weight. Indeed gelatine, "so far from increasing, diminishes the nutritive value of food, as it does not disappear in the body without leaving a residue."*

Such an outline will suffice to show the variety of the compounds in meat, their relative amounts and importance, and demonstrate the necessity of inquiring how far the present modes of preservation fulfil *all* or *any* of the conditions requisite for a perfect material, hygienically as well as practically, and whether the method I have introduced does not offer a scientifically *correct*, *economic*, and *perfect* means of preserving meat with its natural elements, and even with those of vegetables artificially added. I will, therefore, briefly review the methods in use, in order to examine how far this is the case.

First, as to the "cure" by salting, in ordinary use. Salt, as an antiseptic, is so abundantly furnished by nature, is so economical and successful in effecting a "cure," that naturally it occupies the first place, not, however, *as ordinarily used*, without causing grievous injury to the meat—*hygienically by abstracting nutrition*, and *financially by losing weight*—as every one knows that meat by being salted loses in weight, though if left in pickle, occasionally after a time it is found to gain, not, of course, by nutritive material, but by the admission of pickle. Liebig has so fully investigated this subject, and proved the unsuitableness of such a mode of preservation, that he remarks:—

* *Liebig's Letters on Chemistry, p.* 444.

"Of 3 cwt. of meat by the operation of salting, 1 cwt. may be rendered useless to the vital process,"*

And "it is universally known that in the salting of meat the flesh is rubbed and sprinkled with dry salt, and that where the salt and meat are in contact, a brine is formed, amounting in bulk to one third of the fluid contained in the raw flesh. I have ascertained that *this brine contains the chief constituents of a concentrated soup, or infusion of meat*, and that, therefore, in the process of salting, the composition of the flesh is changed, and this, too, in a much greater degree than occurs in boiling. In boiling, the highly nutritious albumen remains in the coagulated state in the mass of flesh; and in salting, the albumen is separated from the flesh; for, when the brine from salted meat is heated to boiling, a large quantity of albumen separates as a coagulum. This brine has an acid reaction, and gives with ammonia a copious precipitate of the double phosphate of ammonia and magnesia. It contains, also, lactic acid, a large quantity of potash and kreatine, which, although I could not separate that body from the large excess of salt, may be safely concluded to be present from the presence of kreatinine, &c. "It is now easy to understand that in the salting of meat, when this is pushed so far as to produce the brine above mentioned, a number of substances are withdrawn from the flesh which are *essential* to its constitution, and that it therefore loses in nutritive quality in proportion to this abstraction. If these substances be not supplied from other quarters, it is obvious that a part of the flesh is converted into an element of respiration, certainly not conducive to good health. It is certain, moreover, that the health of a man cannot be permanently sustained by means of salted meat, if the quantity be not greatly increased, inasmuch as it cannot perfectly replace, by the substances it contains, those parts of the body which have been expelled in consequence of the change of matter; nor can it *preserve, in its normal state*, the *fluids* distributed in every part of the body, namely the *juices of the flesh*. A change in the quality of *gastric juice*, and consequently in that

* *Letters on Chemistry, p.* 448.

of the products of the digestive process, must be regarded as the inevitable result of the long-continued use of salted meat. And if during digestion the substances necessary to the transformation of that species of food, be taken from other parts of the organism, these parts must lose their normal condition."* As the meat prepared for stores is afterwards packed in brine and headings of salt, a constant further abstraction takes place, so that the nutritive power already so low, is still further reduced, and probably exhausted; and the evils now attributed to the salt in the salted provisions are not due to its presence, but to the abstraction of the natural constituents, and to the injury done to those remaining. So far from salt being injurious *per se*, the natural instinct of animals shews the contrary. The experiments on animals by Bousingault, shew its advantage; and, strange as it may appear, the difference of food has no influence on its amount in the blood. The blood of a dog fed eighteen days on flesh had the same proportion as after feeding twenty days on bread. "Some cause is in operation, which *(as the proportion of salt in the blood* never goes beyond a certain limit) opposes the increase, as well as the diminution of its quantity. Consequently salt is not merely an accidental but an essential and constant ingredient in the blood, and its quantity is fixed within certain limits."* The very fact of the impossibility of drinking sea water, or the water of the tanks, where any of the sea water has unfortunately got admission, proves amply that the blood, having already its fixed amount, will not take in water containing salt disproportional to it. A simple experiment also puts it beyond question. "If we drink, fasting, every ten minutes a glass of water, the proportion of salt in which is far below that of the blood, after drinking the second glass the kidneys secrete a quantity equal to the first, and so on; for twenty glasses we have nineteen secreted. But if we add some common salt—about one per cent.—no secretion takes place, and it is hardly possible to drink

* *Chemistry of Food*, p. 135.

more than three glasses, shewing that the blood will not take in beyond a certain amount."*

It is plain, therefore, that the evil effects of a sea life, as scurvy, &c., which have been attributed to the taking in of salt, do not arise from it, but from the *incomplete nature of the meat;* for while in scurvy patients were subsisting on the same meat as before the attack, yet, by the addition of lemon juice, recovery took place without diminishing the salt, but supplying some elements contained in this and other vegetable products. *In its preparation as food* on board ship, of course salt meat of ordinary "cure" can only be prepared by boiling. There is *no variety;* and any nutriment it *may* possess after the "cure" and packing is taken away by the water in boiling, which *cannot* be used for soup, hashes, &c.

In the preparation of meat in tins hermetically sealed, the fluid necessary for the boiling is extracted from the bones which contain gelatine, as gelatine soup, and, of course, forms, and is intended to form, a considerable bulk and weight of the case or tin, but of a material valueless for nutrition, and even hurtful—as shewn by the experiments before related. While, from the inconvenience of carriage and expense, but a small supply of this meat, with a large proportion of gelatine, can be given as rations, and, by the great heat to which the flesh is exposed during its preparation, the chemical elements are changed. As the meat can only be served as thus contained in the cases in *bouillie*, it becomes disliked as an article of food, from its sameness and taste, also causing indigestion and loathing. Financially, the great loss entailed by cutting the flesh from the bone, and in small pieces, is a considerable objection, as is also the fact that expensive and local apparatus is required for the preparation, apart from the expense of the tins.

Encrusting with different varnishes, so far has been found inefficacious, as the water contained within the meat causes decomposition,—while the difficulty of covering all the inequalities is very great.

* *Letters on Chemistry*, p. 432.

Keeping the meat immersed in antiseptic fluids of course gives to the fluid all the nutritious materials above alluded to.

Packing in melted fat, though comparatively successful for small substances, on a large scale, would be both inapplicable and expensive, though the dried meat might be dipped in, or lightly covered with, such material for packing.

The method I have introduced *is not open* to these objections, either financially or scientifically. It is based on anatomical principles, taking advantage of the means nature has already used in supplying the circulating fluid to every *most remote and minute tissue* of the body. The difficulties hitherto were, that if the animal was killed as usual, the fluid introduced into the circulatory organs, capillaries, &c., would escape at the incisions in the vessels by which the animal was bled to death, and therefore not enter or saturate the flesh; and if, on the other hand, the incision in the vessels was *not made*, and the blood not let to escape, it would remain in the capillaries, &c., coagulated or otherwise, and prevent the fluid entering, and so attaining the very parts required; and once a small portion of meat would become decomposed, it would speedily propagate itself to the mass.

Brine and preservative fluids have been endeavoured to be forced into meat by atmospheric pressure, but without success; and even still the method of "squirting" meat with a syringe, introduced into the mass here and there, is practiced with imperfect results naturally. For if the millions of channels afforded by the circulatory tree for reaching in the natural way all the flesh be not made use of, *no other humanly devised method* of doing so can be as successful. Yet a very simple, rapid, and most inexpensive method can be attained, by rightly availing ourselves of the means offered. The following is a brief description of the new process I have invented "The animal is killed by a blow on the head, piercing the brain and causing instantaneous death. The chest is then at once opened, and the heart exposed. An incision is made into the right side of it: either the right ventricle or auricle,—and directly another into the left

side (the left ventricle); the blood from the right side (venous), and from the left (arterial), immediately rushes out. When it has ceased flowing, a pipe is introduced into the incision in the left ventricle,—and so into the aorta, or great vessel leading through the body, *i.e.*, the trunk of the circulatory tree, and is there firmly retained. This pipe can be connected by a coupling with a stop-cock fixed to a flexible tubing, twenty to twenty-five feet long; and this tubing communicates with a tank raised the height of the length of the tube, into which brine and a little nitre is put when well strained (about one gallon to the cwt.) The stop-cock is connected to the pipe in the aorta, and the fluid let on; it will rush out at the incision in the right side of the heart, after traversing all the circulatory organs, in four or five *seconds* in sheep, swine, and such like,—and in nine or twelve *seconds* in oxen,—and in two minutes or so in the latter, and proportionately less in former, will have all run through—thereby clearing the vessels and capillaries, and preparing for the second stage, which is performed simply by closing the incision in the right side with a strong sliding forceps, and thereby rendering the circulatory system perfect, as originally—but with the vessels free and ready to receive the preservative fluid.

Into the tank above alluded to, the final materials to be used are introduced, and turned on as before, when rushing through and thus filling the circulatory tree, and the opening in the right side being *now stopped up*, the fluid over-distends the hitherto empty vessels; the flesh surrounding the capillaries takes up the fluid in every part; and it, as well as every tissue of the body, will thus be saturated with preservative fluid; whatever may be used, a few minutes suffices for the whole operation.* It is no exaggeration to say that, with proper arrangements, an entire ox could be preserved with ease in ten minutes—and this without labor or anything worth calling machinery, and with nominal expense. The perfection of the process is *proved* by the fact, that when the animal has

* One gallon of saturated brine and three ounces of saltpetre to the cwt. increased if necessary, to double the quantities, will answer for general purposes.

lain about three quarters of an hour to let the tissues be thoroughly saturated, it may be cut into pieces of suitable sizes—not too thick, to prevent a reasonable escape of the water by evaporation, and hung up at once to dry in a chamber with a good current of air, and a little smoke; or without it, if preferred; if possible, furnished with a revolving ventilator worked by water or steam. Failing these arrangements, it should be dried, if on board ship, by suspending in the air or aloft; if on land, in a chimney or some convenient situation dry and well ventilated.

The amount of drying, smoking, and size of pieces, and the appearance given to them, are of course matters of detail and taste, as well as are, to some extent, the materials. I use, as far as possible, those adopted in ordinary means, applied differently, but in accordance with the scientific view, of presenting a perfect material for the seamen and soldiers. I add such substances as will supplement those ordinarily obtained on land from the *vegetable kingdom*, and also improve the meat by adding to it as a plastic or nitrogenous element of nutrition, a carbonaceous or respiratory element in the shape of sugar, which at the same time improves the taste, gives softness, and acts as a preservative, while it supplies a normal respiratory material for forming lactic acid, the importance of which having been before explained, it is superfluous again to allude to; but it is necessary to notice that, as the meat prepared by my process is cut directly from the animal, it contains, of course, all the fat natural to it, being the normal respiratory food, "or producer of heat," combined with the meat, which is the plastic, *i.e.*, building-up food for the organs and structures, or "producer of force." For the latter purpose, as plastic food, 17 parts of lean beef equal 56 parts of wheat flour, 67 of rye flour, 96 of potatoes, and 133 of rice; while for the former purpose, of heat-producing, 1lb. of fat is equal to 2·4lbs. of starch, 2·5 of sugar, and 7·7lbs. of pure flesh.

By the addition of sugar, as I propose, a respiratory food of a very important nature is added, and therefore the meat for navy stores can be *still more* fitted for a substantial and life-supporting food for the sailor, who finds in the spirits, rum, &c. served out to him, heat-producing

foods, though "most costly materials of respiration, the same effect could be produced in the body by means of saccharine and farinaceous articles of food, at one-fourth or one-fifth the cost."*

As the sailor has at present sugar issued to him (the advantage of which experience has pointed out), and only objectionable from its taste, or when given in too concentrated a form, that is, too much at one time for the action of the stomach, surely it would be more economical and efficacious to add at least part of it in the meat.

Phosphoric acid, which, as before shown, is so important an element for the perfection of the functions of the body, as supplied in vegetable food, is more or less denied to the sailor. I propose to add it to the meat in certain small quantities—half an ounce or more to the cwt.—and in the form found in the flesh of fowl,† namely the monobasic or meta-phosphoric acid; as it, when prepared in this form, has the property of coagulating albumen. Its use is obvious by retaining this very desirable "force-producing" element in the flesh, at the same time giving a phosphatic supply, which, from the analyses above cited of the usual articles of food, is proved to be so requisite. As the albuminous material, when *fluid*, is very apt to decompose, its coagulation prevents this accident; and if it be determined afterwards to pack the meat in brine as usual, the coagulated albumen will be retained. It is to be explained that the addition of phosphoric acid is *not necessary* to my process, though to some extent useful as a preservative of the albumen; but I recommend it for the sailor and soldier in campaign, *as a dietetic addition* of great importance, in the absence of vegetables. Lemon-juice, at present issued at much expense, I believe only serves in making amends for the injury done to the meat in the ordinary process of "cure," and that in this way chiefly it acts as an antiscorbutic; for as the meat has lost, according to the estimate of Liebig, *one third* of its properties for sustaining the vital process, and as a scorbutic patient, *though still* subsisting on this meat, with

* *Liebig's Letters on Chemistry*, p. 470. † *Chemistry of Food*, p. 98.

the addition of lemon-juice will recover strength, it is evident the meat is injurious, not by its *positive*, but its *negative* properties; so that scurvy and various forms of debility arise from mal-nutrition, and not from the addition of salt, as has been so generally supposed; for even salt water has been given to scorbutic patients without aggravation of the symptoms. Though scurvy may not be seen in its intensity now as some years since, yet, the testimony of Dr. Macleod puts its existence, and that in an insidious form, beyond doubt. He states:—"Scurvy was the great destructive agent against which it was most difficult to cope, and which, though but little cognisable by its usual signs—though often carefully masking its presence behind some other ailment—*yet influenced every disease and touched with its poisoned finger every wound.*"*

An inquiry into the symptoms will bear out this view. The most striking evidence of the change of the blood fluid (or the loss of that property it possessed of circulating in minute vessels without filtration), is shown by the well-known appearance of the bleeding gums, and the extravasations and blotches, that take place in various parts of the body, but can be explained by the want of the proper circumstances for sustaining the electrical influence described by Liebig; for if the phosphoric and lactic acids and the potash salts be wanting in the muscle-juice, and the phosphate of soda in the blood, the necessary conditions cease, and the filtration of the blood fluid and colouring matter takes place throughout the body.

The urgent symptoms of want of respiratory power shown by the difficult breathing, dusky hue of skin, fainting, rapidity of breathing, &c., *though the lungs are remarkably free from any disease*,† can only be explained by some want in the blood for taking its part in the process. As the machinery, if we may call it, of respiration is perfect, there must be a defect in the circulating material. As the great agent in the circulation, the phosphate of soda of the blood, has not been supplied, there is no means of carrying the carbonic acid and supporting respiration

* *Macleod, Notes on the Surgery of the Crimean War, p. 69.*
† *Library of Medicine, vol. v. p. 83.*

and animal heat. Therefore, scurvy is observed to come on sooner in cold countries, or where damp clothes are worn, and where the men are on limited rations, under circumstances where the respiratory process should be particularly perfect. The muscular debility remarkable in this disease follows from the want of the proper supply of circulating fluid and chemical constituents. All the symptoms, in fact, can be traced to the want of the natural elements which have been abstracted from the meat. In order to test this idea, and as the analyses given in books supplied no information, at my request lemon-juice from the admiralty stores was analysed by Professor Galloway, Museum of Irish Industry, Dublin, the result showing the existence of important constituents not before enquired for, but of well-known utility.

Analysis made April, 1864, gave, in one gallon of lemon-juice, phosphoric acid equal to 91 grains of anhydrous acid, or 458·5 grains of ordinary phosphate of soda.—The potash was not estimated.

Two analyses made in October, 1864, gave 71 grains of neutral or diphosphate of potash per gallon, and, in addition to this, about 110 grains of potash in the form of other salts.

The Potash Salts I add by my process, as nitrate of potash, phosphate of potash, or chloride of potassium. The former I believe to be most suitable for general purposes, giving colour to the meat.

The other crystallisable substances, *kreatin*, &c., enumerated before, are of course retained in their natural conditions, as no means are taken to remove them.

The addition of spices—pepper, cloves, and condiments; also such flavours as may be desired, lactic acid itself, saur krout, &c.,* can be made at a very trifling expense, in this way pleasing all tastes and requirements.

Though any preservative fluid can be infiltrated, I

* Or citric acid, the product of the evaporation of lemon-juice, tartaric acid, and other antiscorbutics, as may be determined by the authorities.

prefer to use that in most general use, such as pickle with sugar, saltpetre, nitrate of soda, phosphoric acid, spices, &c. Pickle and saltpetre or nitrate of soda suffice for the mere cure, so that *an entire ox can be preserved* for less than one shilling; sheep, swine, &c., for a few pence. If the other materials, as I recommend, are added, they of course add to the expense, but are so much more important and agreeable food,—therefore a saving.

The fluid can be used either cold or boiling, which latter state I avail myself of in some circumstances where, for instance, it is determined to pack the meat in brine afterwards. The boiling fluid, on admission to the flesh, coagulates the albumen and gives a "set" to the meat, so that this albumen cannot separate from it in the casking.

When the meat has been dried and smoked according to taste, it can be packed in cases of sheet iron, in barrels, or tins, either protected from any accidental moisture which would harm them, by dipping each piece in melted fat, so as to make a coating, or by packing in dry sawdust, either alone, or, which I prefer, with powdered charcoal mixed in equal parts. This packing material should be sufficient to thoroughly cover the pieces.

When about to be used, the meat should be washed to free it from the packing dust, and steeped for a few hours in water, or not, according to taste; then prepared as ragouts or hashes, with pea-meal, flour, and such materials as may be had on board ship. By the present system the meat, already deficient in nutritive power, is boiled, and the fluid *thrown away;* whereas the "hung" or "dried" meats can be prepared in ragouts, hashes, soups, and roasts; so that the fluids containing the soluble elements would be taken along with the meats. If for roasting or grilling, the meat may be steeped a few hours in cold water,—and if for making soup (which can be done even for invalids), after a little steeping it should be cut up in very small particles, and so gently heated—such farinaceous matters being added as are accessible. In fact these meats admit of being prepared for food in any way the ingenuity of the "cuisine" may determine, thus of

course presenting advantages not to be obtained by any other known process.

A very important convenience also is attained, that the meat, not containing the large amount of fluid originally in combination, can be carried in small bulk. Each man could take with him in perhaps one-half or one-third the bulk, the amount of *nutriment* contained in the whole; and again, this meat can be eaten (if circumstances require it), without cooking.

Apart from the economy and efficacious nature of my process, there is presented to the authorities this very great advantage, that nothing is done *in secret*. All the stages of the process can be inspected by the officers appointed, so that the health of the animals and the wholesome quality of the meat could be certified; while meats can be prepared at all seasons, and equally well in summer and autumn, when the animals, having recently been fed on the fresh grasses, are nearer to their natural condition, and their flesh better food, being supplied with the earthy salts, &c. The price is also less in the summer and autumn,—for in winter, by the great demand on the market for the "curing" months, the price is considerably raised. On the other hand, there is no doubt as to the injury done to the meat in the ordinary means of "cure;" and as to the preserved meats in tins, there is no means of knowing the condition or health of the animal (though of course the known respectability and high name of manufacturers is more or less a guarantee); while, from the large amount of gelatine soup in the cases, much expenditure is made on a valueless and hurtful substance, though one which, from popular impression, is believed to be the reverse.

A *vast advantage*, and one *altogether unprecedented*, presents itself in the use of my method, namely, that on the arrival of a ship at port, meat can be prepared and preserved on the spot or on board, and in a *few hours* a stock for stores furnished, as the apparatus is portable (not costing more than a few shillings), the materials always to be had, and also the necessary height or pressure. In hot countries the meat may be drying, and in process of preservation, half an hour or so after the death of the

animal. If it is desired to be kept drying slowly, it should be suspended in pieces between decks,—or if to be dried quickly, it might be suspended either aloft or in an extemporized drying shed.

From the description already given, it is plain that the labor required is nil.

I would beg *most strongly* to urge the advisability of having certain officers and men on board each ship instructed in the method, and to practice it wherever animals may be found; as the *necessity for carrying a large store of provisions* would be thus obviated, while a superior and better tasted material could at all times be prepared at an extraordinarily cheap rate, and even in countries where decomposition usually sets in after a few hours.

I would, in conclusion, remark, as to the process itself, that success in some circumstances is attainable without the use of the first stage, *i.e.*, of washing the circulatory apparatus; but it is a most desirable preliminary stage, as I have found by experience, and therefore I strongly recommend it.

Notwithstanding the simplicity and rapidity of my process, though based on anatomical and correct principles, of which I have endeavoured to give an outline, I am, from experience, both in England for the admiralty, and in France before a commission appointed by government, so thoroughly persuaded of its efficacy, its adaptability for use in all weathers and climates, and the perfection of its results, that I am solicitous of the fullest trials and enquiry in every way by the authorities; though at first sight prejudice, or the natural objection made to any innovation or change, may present difficulties. I am sure that experience and enquiry will satisfy both as to the mechanical applicability, and scientific correctness of the method; while as to details of flavors, appearances, and size of pieces, experience alone on an extended scale of trial can decide what may be the most generally suitable, convenient, and pleasing.

In countries where animals are all but valueless, and where labor is scarce or unavailable, my process is peculiarly valuable, and will directly, I expect, be the means

of introducing here a suitable, wholesome, and agreeable meat for the million, at a most reasonable price, and containing all the nutritive properties.

In January and February last I was allowed to prepare fifteen oxen for the Admiralty at Deptford. In twenty-four hours some of the meat was packed as usual in barrels, and some pieces put to dry in the most convenient situations at the victualling yard. With part, a very great heat in the biscuit-drying loft, (about 120°,) was used successfully, and the drying accomplished in a few days. Other pieces were hung in the cooperage chimney, and dried after a few weeks time. By the report of the officers, both these meats having been packed dry in ordinary barrels till August 30th, 1864, when opened and examined at that date were pronounced perfectly preserved, showing that so far, after the lapse of seven months, the material is sound, and capable of preservation through the hot summer months, in barrels, and that without the erection of any special apparatus, in the first instance, as would be desirable for the drying.

In June and August last I operated before a Commission at Rochefort, appointed by the French Government, and prepared both oxen and sheep, in the height of a continental summer, with perfect success, though with but extemporized apparatus. When dried some time, the meats were prepared as ragout, beefsteak, chop, the latter of course grilled. Nothing could be better, particularly than the beefsteak. Soup was also prepared of excellent flavour and appearance, thus showing the value of this material for invalids, while from the artificial addition of sugar, phosphoric acid, potash, &c., it is manifestly particularly suited to the requirements of the sailor—invalid or in health.

Most important testimony in favour of my method has been given by Dr. Parkes, Professor of Military Hygiene, Army Medical School, in his work on Practical Hygiene just published. At page 215 it is remarked, with reference to the process, "This is an excellent plan, and will undoubtedly supersede the old system;" and again, under article "Sieges"—"If food threaten to run short, the medical officer should remember how easily Dr. Morgan's

process of salting meat can be applied, and in this way cattle or horses which are killed for want of forage, or are shot in action, can be preserved."

The foregoing remarks of course do not profess thoroughly to examine the subject in all its details, but are intended to put forward my views as to the causes of scurvy, and to suggest the remedies:

Firstly, of preserving meat in a perfect condition, retaining all its natural constituents.

Secondly, of adding such antiscorbutics as may be determined—those I propose being in accordance with chemical and practical experience, namely, phosphoric acid and the potash salts, which are tastelessly and economically added to the flesh by my process.

The practicability and advantages of this process are now fully recognized, the "*Morgan Patent Meat Preserving Company* of Liverpool being actively engaged in the importation of beef and mutton from the South American continent and the Falkland Isles, where hitherto millions of animals have been lost as food for want of an efficacious and economic method of preservation. Men and requisites have been sent out by the Company to South America, and in a very short time an abundance of well preserved and most economic food will be presented to the public.

The experiment of preserving beef in Australia during the hot season has been made by the Messrs. Davis of Fenchurch Buildings, London, and Australia, and meat has been brought to this country, and also supplied to shipping on the home voyage, with complete success. The Messrs. Davis are now having the process adapted on a large scale in Queensland and South Australia, establishments being formed for the utilization of the vast supply of superior food hitherto boiled down for the sake of the fat.

Meat prepared by the process, boned and dried, and thereby affording great convenience of carriage with unimpaired nutritive quality, has been prepared for the United States Government, and it is now under trial.

The agency of the patentee is established at 9, Broad-street, New York, where all information with regard to commercial use can be had.

ON

SANITARY

LEGISLATION AND ADMINISTRATION

IN ENGLAND.

AN ADDRESS,

PORTIONS OF WHICH WERE READ BEFORE THE PUBLIC-HEALTH DEPARTMENT OF THE NATIONAL ASSOCIATION FOR THE PROMOTION OF SOCIAL SCIENCE, AT ITS INAUGURAL MEETING, HELD AT BIRMINGHAM, IN OCTOBER, 1857.

BY

HENRY WYLDBORE RUMSEY,

AUTHOR OF

"HEALTH AND SICKNESS OF TOWN POPULATIONS,"

"ESSAYS ON STATE MEDICINE,"

ETC. ETC.

LONDON:

JOHN CHURCHILL, NEW BURLINGTON STREET.

MDCCCLVIII.

"If the subject be large and complex, the state natural to a comprehensive mind at the first approach to it, is a state of some confusion and perplexity, and this is the best state to begin with; for he whose mind is not seasonably inconclusive, and cannot bear with a reasonable term of suspense, will either get wrong, or get right more tardily by means of after-thought and correction.

"To hold the judgment free upon specific points in a question, until the mind have taken a general estimate of the proportions and relations of its several parts, and have become somewhat familiarised to the hypothetical aspects of it, is the indecisiveness of reason and wisdom.

"This is the *couchant* attitude of the mind, which best prepares it to secure its prey; or (to transfer the metaphor) it is the wheeling survey which precedes the stoop. But when the time comes to stoop or to pounce, the energy ought to be in proportion to the previous abstinence. Thus the stages in the consideration and decision of a question, as in the adopting and pursuing a course of action, ought to be marked by more of patience and circumspection at the beginning, more of energy towards the end. 'Prima Argo committenda sunt, extrema Briareo.'"

Taylor's Statesman, p. 142.

TO

SIR BENJAMIN COLLINS BRODIE, BART., D.C.L., V.P.R.S.,

CORRESPONDING MEMBER OF THE INSTITUTE OF FRANCE,

SERGEANT-SURGEON TO THE QUEEN,

ETC. ETC.

MY DEAR SIR,

IN dedicating to you this little effort to promote sanitary legislation on sound principles,—I desire, in the first place, thus to mark my recognition of the principle, that—as the Physical Sciences are the constitutional foundation, so Hygeiology, with its legal formulæ, is but a province, of the empire of Medicine;—further, to express my heartfelt satisfaction to see one, who has so deservedly attained the summit of professional distinction, devoting his time, thought and influence, as President of a Department of the National Association, to the advancement of reforms deeply affecting the welfare and happiness of every class of society;—and, not least, to acknowledge gratefully your many acts of kindness to me—your many valuable lessons, professional and ethical, from the commencement of my medical life to the present time,

Believe me to remain,

My dear Sir,

With much regard and respect,

Yours faithfully,

H. W. RUMSEY.

ADVERTISEMENT.

The following Address might not have appeared in a separate form, had not its length—with notes and appendix—far exceeded any limits of space which could be allowed to a single paper in the volume of Transactions, about to be published by the National Association.

I gladly take this opportunity of thanking members of the Association, and others, present during the reading of portions of this Paper at Birmingham, for their strongly expressed wish that it might be published; and my acknowledgments are especially due to the Printing-Committee for their complimentary proposal to print all that was read of it.

A Paper, on the Territorial Distribution of the Population for purposes of sanitary inquiry and social economy, read before the British Association for the Advancement of Science, at Cheltenham, in 1856,—and another Paper, on the Local Encouragement of Science by the State, in reply to an inquiry by the General Committee of that Association,—are added in the Appendix, because they treat more fully of some details belonging to my subject, for which there was no fit place in this Address.

Cheltenham, *December*, 1857.

AN ADDRESS,

ETC.

I. The variety, importance, extent, and general connexion of matters properly comprehended under the term—Public Health, contrasted with the deficiencies, anomalies, limited application, and inefficient administration of our Sanitary Laws.

Introductory.—Questions of Public Health may be discussed before three very different audiences, and the method of treating them must vary *in toto* accordingly.

One man, as the Sanitary Educator, may address the people either in public lectures, or in cheap and popular publications; or he may instruct the youth of a community in their schools, and mothers of families in their dwellings. His subject would then include something of Elementary Physiology, and the chemistry of common life. His object would be to teach the art of self-protection against causes of disease, in respect of climate, food, exercise, domestic management, and so forth,—to enlighten the uninformed on their physical relations with "common things," and on their social duties and responsibilities, and thus to promote a ready and hearty obedience to those more general sanitary laws which apply to communities and nations.

Another, as the Professor of Hygeiology, may indoctrinate his class of students in the principles of sanitary investigation, in the Sciences of Vital Statistics and Ætiology, in the art of Preventive Medicine, and in the practice of Forensic Medicine. His argument would then be addressed, as it were, *ad clerum*

rather than *ad populum*; and his object would be to aid in supplying the community with the popular teachers just mentioned, and the State with a trained body of sanitary officers, skilful detectors of obscure causes of disease and death, and able public advisers in those contingencies and circumstances which threaten the lives and health of the people.

A third, as the Social Economist and sanitary jurist, may discuss the principles, details, and mutual relations of laws for preventing disease and mortality, and for improving the physical condition of mankind. He may treat of the administration of those laws, and he may appeal either to the Government and Legislature of his country, or to the classes which influence that Government, and among the latter to associations of men of science and administrative experience, like that which I have the honour to address.

The remarks I am about to offer, it is almost needless to say, belong only to the last mentioned head of sanitary discussion. But, as preliminary, I shall endeavour briefly to sketch a comprehensive outline of this vast subject, in order that I may show, if only by implication, how limited and imperfect are those prevalent notions which have led to the enactment of narrow, fragmentary and inefficient measures.

Scheme of Sanitary Legislation.—A Sanitary Code ought, in the first place, to constitute a machinery for investigation. In providing for the accurate record and collection of facts relating to the mortality, reproduction, and diseases of the community, the State should include a wide field of social statistics, authorizing inquiry at stated intervals into the location, distribution, and density of the population,—the habits, occupations, and circumstances of the people,—their dwellings and their food.

A national system of sanitary investigation is incomplete without accurate topographical descriptions of the site, elevation, aspect, climate, and soil of all inhabited places, accompanied by periodical records of the course and condition of all running and stagnant waters, and marsh lands, especially of those in the neighbourhood of inhabited districts. All this information should be illustrated by contoured maps on a large scale. The same system would include scientific registration of meteorological observations in every district. It

would also involve chemical and microscopical researches, with close and regular notice of the phenomena of organic life (animal and vegetable) in relation with, or proximity to, man. The Physicist, therefore, as well as the Statist, must take his place in any national system of inquiry.

Medico-legal inquiries are generally placed, in systematic works, under a department of State Medicine, distinct from that of Public Health; but, practically, medical science cannot be brought to bear effectually upon civil and criminal cases, except by persons versed in the principles of sanitary investigation. Moreover, an accurate registration of the causes of deaths and public calamities is absolutely essential to the completeness of forensic inquiry; and the superintendents of the former become the most useful *experts* in the latter. Hence the Medical Jurisprudence of a country has its administrative and educational connexions with a general sanitary organization.

The State being thus in possession of all necessary and useful information, proceeds to diffuse it, in order to justify, enlighten, and direct action (whether this be corporate and legal, or individual and voluntary); whilst cognate laws, framed upon that information, become indispensable for regulating the public life, and the aggregate habits and movements of the several groups of population.

The principles, the forms, and the administration of these laws should be in harmonious correlation; whether they apply to the localities which have been or may be selected for human occupation; or to the drainage and irrigation of the land in general, the conservation of rivers, the prevention of floods, and the direction or repair of water-courses; or to the site, plan, and construction of towns and dwellings, their aeration and water-supply, their purification and health police; or to the abandonment of such places and removal of such buildings as are incapable of profitable improvement; or to the formation and repair of roads, and to personal safety in locomotion, whether by land or by water—the latter involving a variety of sanitary regulations for ships and ports.

The same congruity of purpose ought to exist between those laws which regulate certain trades and occupations, with reference to the safety, health, and convenience of the communities

in which they are carried on,—and those which protect the people against supplies of impure, unwholesome, and adulterated food, or which regulate the sale of poisons and drugs. And such enactments, of both kinds, should be administered by the same central and local authorities.

No sanitary code can be considered complete without provisions calculated to promote the healthy succession of the human race, and the development of a vigorous progeny. Thus, the hygienic management of childhood and the physical training of youth may be enforced in all public establishments and schools; and it may be encouraged and aided among the masses, without despotic interference, by official instruction and domiciliary visitation, as also by laws tending to check the withdrawal of mothers of families from domestic duties to labour in field or factory.[a] Where the legislature has provided, as in England, for the protection of women and children, in all kinds of labour likely to be physically injurious, the enactments to be thoroughly effective must be administered under independent scientific advice and inspection. And, as in the toils, so in the recreations of the people, especially in all buildings for public resort, precautionary measures need to be enforced under the same scientific direction.

No comprehensive legislation can fail to recognise the connexion between the public health and the particular vice of great towns; to prevent, as far as possible, the demoralization of the weaker sex, and to guard against the spread of pollution; to check the propagation of disease, and thus avert its baneful consequences from unborn generations;[b] and mercifully to afford ready means of rescue to the fallen.

Thus, also, the intemperate use of alcoholic and fermented drinks (the cause, direct or indirect, of perhaps half the preventible sickness and mortality of the working classes) may be checked not so surely and safely by arbitrary prohibitions, as by the judicious interference of a staff of sanitary advisers, and

[a] Inasmuch as field labour is necessarily limited to hours of broad daylight, and as mothers engaged in it are often (weather permitting) accompanied by their little ones, it is by no means so incompatible with domestic duties and family obligations as factory labour. Besides, within proper limits, it tends to make a hardy race of women, and so to raise a vigorous progeny.

[b] Nearly 3000 deaths by congenital syphilis are counted in the Registrar General's last septennial summary.

by laws which promote the home-manufacture of purer and wholesomer beverages.

Again, laws for the burial of the dead, however wisely framed and zealously administered, are likely to miss their sanitary object unless carried into effect by scientific superintendents, and in connexion with other hygienic precautions.

If, as will scarcely be denied, the legalized care of the Public Health includes the before-named provisions, which apply to the population generally, it has no less important relations with distinct portions of the community under exceptional circumstances, such as the inmates of public establishments.

Thus the sanitary regulation and inspection of Prisons, Penitentiaries, Schools, Orphan Institutions, Workhouses, and Almshouses, cannot be reasonably separated from the general sanitary supervision of the country.

When we pass the limit of Preventive Medicine, wide is the field for connected legislation in the arrest and palliation of disease itself; impossible is it to separate these provisions from the former category. The direction of the medical care of the poor in districts; the public supervision of hospitals, whether for general purposes, or for the several kinds of disease and infirmity, mental and bodily, to which these noble establishments are devoted; the regulation of mineral baths, and convalescent institutions;—all these demand and receive the attention of Government in the majority of civilized states.

Intermediately between preventive and palliative measures lies the vast and complicated question of legal interference in pestilences, epidemics, and epizootics; how to meet them vigorously and efficiently when preventive measures have failed; how to check their progress and shorten their invasion; in what diseases and under what circumstances to require isolation of the sick, or separation of the healthy; and how to organize certain medical measures of prevention, as vaccination. All these obviously require to be framed and executed in well-considered relations with other details of a sanitary code.

Lastly, as to the administrative machinery by which all these laws are to be carried into effect; including, on the one hand, the scientific education and practical training of the several classes of agents to be employed, the methods of testing their competency, and regulations for their appoint-

ment and duties,—all this bearing materially upon medical education and organization; and, on the other hand, the judicious constitution of boards and councils, central and local, and a wise distribution of the population, or division of the country into districts, suitable alike for the jurisdiction of local authorities, and for the working of a national system of statistics, which I assumed to be essential as the basis of all sanitary measures.

Prospects of Comprehensive Legislation.—Every one present on this occasion knows how easy it would be to enlarge the foregoing sketch of the principal objects of sanitary law; and few would be disposed to deny that the time has arrived when we might reasonably call for comprehensive legislation on the several heads of the subject. Not that it would be possible, even if it were desirable, to legislate constitutionally yet philosophically upon all these matters in a Parliamentary session or two; nor that it would be right to postpone some very necessary and obvious amendments in the laws relating to Public Health, because the whole group of questions cannot be mastered at once. But we may, and in my opinion we ought to demand that every instalment of sanitary reform shall be part of ONE large and statesmanlike project, *altâ mente repostum;* so that as the several measures are produced, one by one, in judicious succession and when the public mind is prepared for them, they may fit harmoniously together, like the architectural details of some vast pile, planned at one time though reared at intervals, and when completed, exhibiting its unity of design, and standing in simple grandeur, an object for the admiration of mankind. It is by such a method only that the *membra disjecta* of hygienic law in our statute book can be reclaimed and connected.

It is thus alone that our incoherent attempts to remedy particular insalubrities may yield in time to something like a consistent system of sanitary pandects, worthy of so great and so intelligent a nation.

We should, moreover, recollect that a host of difficulties now in the way of correct sanitary legislation were not in existence some twenty-five or thirty years ago. The field was then comparatively clear. But many obstructive interests

have since arisen, and legal powers have been injudiciously conferred, which, even were the prompt enactment of a comprehensive sanitary code desirable or otherwise practicable, would form almost insurmountable barriers to its immediate adoption.

Popular Misconceptions and their Results.—The first step towards a real amendment in legislative progress must be to detect the sources of past errors. And, I believe, that in this case they may generally be traced to those defective views of State Medicine, which prevail not only among the people and in Parliament, but, I am sorry to say, in the medical profession itself.

One evidence of popular misconception on this subject, is, that laws, which are intended to regulate not one-tenth part of the matters included under the title, are called "Public-Health Acts." The effect of thus bestowing a generic designation upon specific measures is a direct injury to the cause we advocate. The unthinking majority are led to identify questions of Public Health with Town Councils and Town Sewers, and both these often proving nuisances as impracticable as those they are intended to remove—beside being disagreeable topics for the fireside, the club, or the lecture-room—the whole subject is proscribed; while the amendment and codification of sanitary laws, including the organization of an effective official corps for their execution—reforms of incalculable moment to society—are treated as details of mere local management and inferior interest.

Another evidence of the conventional prejudices prevailing among the influential classes on this subject is, that various important and carefully considered recommendations of commissioned authorities, long since promulgated, have been either slighted or rejected by Parliament. It would be easy, did time and space permit, to refer to several suggestions—in the General Sanitary Reports of 1842-3, in the Reports of the Health-of-Towns' Commission of 1844-5, and in later official documents—which have been thus unfairly treated. Yet their expediency has never been doubted by competent judges, and their necessity is now clearly proved by the imperfect action of the measures which negatived them.

Limitation of Public-Health Acts to Towns.—Consequent, again, upon the same popular fallacy, is the limitation of these partial laws to districts, which, owing to their high density of population, specially need improvements of a more costly and operose nature,—*i.e.*, to places which have the character of towns.

But since the people in every district require many general provisions of equal sanitary importance, it follows that their application and administration should be universal—no part, no parish of the kingdom being excluded: while special enactments for the construction of main sewers, water-works, and other expensive public undertakings should be treated as *exceptional* measures, to be applied only to towns or thickly peopled districts.

If clear views regarding this distinction could be established and generally diffused, those unfortunate Public-Health Bills which are annually brought up to be mangled or massacred in Parliament, need no longer be encumbered with numerous clauses to limit or to alter the boundaries of places to which the operation of such measures is to be confined,—clauses which seem to confess and to illustrate the weakness of the cause they are intended to promote. No longer would it be thought necessary to offer every facility to the inhabitants of unhealthy or neglected spots to appeal against the adoption of the very measures they particularly need.

Were the whole of Britain included in sanitary districts, I believe that the Legislature would find no difficulty, because it has already found none, in restricting the application of important structural works to certain parts or wards of those districts. The Public-Health Act, as well as each of its various Amendment Bills, down to that of the last Session, recognizes the principle of separate assessment for particular portions of districts, and many of our existing sanitary jurisdictions are of this composite character.[c]

Since, therefore, exceptions must be made, let them be exceptions to laws of general, not of partial, application.

[c] The separate wards mentioned in Public-Health Bills for the election of members of local boards, ought always to correspond territorially with those parts which require special hygienic treatment and separate assessment. This does not seem to have been provided for.

Main Objections to such Limitation.—Among the reasons which may be urged against confining measures of Public Health to separate communities within defined boundaries, are the following:

1. The rapid extension of the *areas* of towns, with a greater diffusion of their populations (the main point to which sanitary reform should tend), must render those boundaries a constant subject of change, dispute and litigation.

2. So long as the adoption of a Public-Health Act is optional with the inhabitants of any circumscribed spot, strong efforts will be made by a parish-vestry party to exempt their little sphere of petty authority from legal responsibility.

3. The actual condition of some of the excluded places, especially those immediately surrounding the jurisdictions of existing Boards of Health, imperatively demands their inclusion. (But of these suburban districts more hereafter.)

4. All analogy is against restricting laws of general benefit to particular places. The administration of Justice, the management of the poor, the religious instruction (I wish I could add the secular and industrial education) of the people, are happily not confined to places in which they are called for by the inhabitants.

What would have been the result of limiting that great and beneficial social reform, the Poor-law Amendment Act, to parishes which petitioned for its adoption? What would be thought of a Constabulary Act, which enabled certain districts, avowing themselves to be particularly honest, moral, and quiet, to claim freedom from visits of the police? Chalmers long ago showed that opposition to measures of improvement affecting the highest interests of man, would in all probability proceed from the very places which most needed those measures. The demand for exemption would be the proof of their necessity. And, surely, the application of general hygienic laws—often involving questions which have been or have to be solved only by repeated investigations of an abstruse and profoundly scientific nature—ought to be the very last duty of local administration, which a wise and strong government, acting upon the best advice, would leave to the option of any fraction of the community on the ground of its assumed ability to judge for itself in such matters.

Nuisances-Removal and Diseases-Prevention Acts.—It is true that the late Act for the removal of nuisances and prevention of diseases was intended to remedy, in some degree, this glaring defect in the Public-Health Act. It was intended to facilitate the adoption of many important sanitary improvements throughout the whole kingdom; and thus it really deserved the title of Public-Health Act far more than the measures for mere town-improvement to which that title was applied. But how miserably were its objects nullified by the administrative machinery which it constituted. The number of sanitary jurisdictions which it created exceeds 15,000! and these are of no less than seven different kinds,—namely, Local Boards of Health under the Act of 1848; Town Councils; bodies of Trustees and Town-Improvement Commissioners; Highway Boards; new local authorities, to be called "Nuisances-Removal Committees," and to be annually appointed by Vestries; Boards for lighting and watching; Guardians and Overseers of the Poor in single parishes; and to the three last-named authorities are added the Surveyors of Highways.

Fortunately, only one of these seven bodies can act in one place—namely, the first on the list which happens to exist in that place,—but, by authorizing very different bodies to act in adjacent jurisdictions, a new source of confusion—a new element of conflict—has been created.

A most extraordinary omission, however, in this category is that of Boards of Guardians,—extraordinary for several reasons;—first, because these Boards stood (though rather ingloriously at the bottom of the list) in the Bill, but were as ingloriously struck out in the mutilating process before alluded to, and parish officers substituted; secondly, because parochial unions, over which Boards of Guardians preside, are generally identical with Registration districts, and would thus have so far secured "identity of areas for statistical returns with those for sanitary management;"[d] thirdly, because these Boards already perform, or are supposed to perform, a variety of preventive and remedial functions,[e] and perhaps merely require a

[d] See "Essays on State Medicine," p. 49.

[e] "The Town Councils do not come into communication constantly with the poor, or rather the working classes, for whose benefit, I apprehend, this Bill is principally promoted. . . . . The medical officers of the Boards of Guardians constantly visit the poorer classes, and altogether they are, in my opinion, much fitter bodies for the initiation of proceedings of this kind than Town Councils; and inasmuch as these councils do not exist everywhere, and as the Board of Guardians, as nearly as possible, do exist everywhere, and as it is desirable to have one simple form of proceeding, and one well-known body all over the kingdom, to carry out purposes of this kind, I think it very much better that Boards of Guardians should have the powers than the Town Councils."—Mr. Hawksley's Evidence. "Report of Committee of Sir B. Hall's Bill," p. 61.

few additional turns of the Government screw to make them somewhat more active and efficient; fourthly, because the presence of magistrates, as *ex officio* members, might have proved a valuable assistance in the local deliberations; and fifthly, because, by adopting these Boards as sanitary authorities, the State would have had to deal with only about 600 jurisdictions instead of 15,000; and there would have been a uniform method of procedure and a single set of administrative bodies, instead of the strange medley empowered by the Act of 1855.

Let me not be misunderstood. After the sanitary exploits of Boards of Guardians, as celebrated by official historians, one could scarcely venture to recommend them as *the* local health-authorities of the kingdom; neither, in my opinion, are their jurisdictions extensive enough to secure a sufficiently informed and enlightened administration of sanitary law; and, certainly, the exclusive object of their original institution unfits them for wider social duties and responsibilities. But, notwithstanding these disqualifications, they possess more weighty claims for consideration in a future organization of administrative authorities than any of the local bodies named in the Nuisances-Removal Act.

Of this Act, I do not wish to speak harshly, for its objects, as I have said, are excellent, but its errors and omissions are neither few nor unimportant. Its definition of "nuisance"—a most expressive and comprehensive term—is needlessly narrow, and further weakened by very questionable provisos. The smallness and separateness of the jurisdictions it created have prevented in a multitude of cases the application of the intended remedy. A nuisance originating in one "parish" or "place," but only aggrieving another parish or place, will seldom be touched; nobody in the place at fault finds cause for complaint, and the "local authority" of the suffering place cannot act within its neighbour's boundary, and so the nuisance flourishes. Even if several parishes should happily

arrive at an agreement about some specific evil, the Act provides no method for united procedure.

The subordinate officer, who is merely meant to ferret out the commoner nuisances, although dignified with the imposing title of "Sanitary Inspector," is appointed only in a very small number of these petty jurisdictions, and in a still smaller number does he act boldly and efficiently. There is no public prosecutor independent of the "local authority" (which of course often contains the more influential nuisance-factors of the place or their very good friends) to bring crying evils under the action of the law or the notice of a higher authority. And, in fine, the absence of any provision to compel this numerous host of little boards and vestries to perform the duties which they are empowered to perform,[4] renders the Act a nullity.

Composition of Local Boards.—Peculiar to this country is its method of constituting local administrative bodies,—a method which immensely aggravates the evils inseparable from limited town-jurisdictions.

The sole personal qualifications, as we all know, which the law requires of any person elected as member of a Local Board, are—that he resides in the district, "or within seven miles thereof," and that he is either possessed of property to a certain amount, or rated upon a certain annual value as an occupier in the district. Every town-councillor, also, must be a burgess of the borough. The result is that an overwhelming majority of members belong to *one* class of the community—a class consisting of persons whose pecuniary interests are too often concerned in maintaining density of population, and other local causes of insalubrity and social degeneracy, and who therefore seldom escape the *moral* infection of the spot.

Neither the Municipal-Corporations Act, nor the Public-Health Act, nor the Metropolitan-Management Act, provide any security for a fair representation of *all* classes of society. Nor does the law permit a proportionate addition of persons selected on account of position, liberal education, philanthropic

[4] "Parliament may confer powers; but where their exercise conflicts with private interests, and is not secured by penalty, they will remain a dead letter."—*Scrutator*, Gloucestershire Chronicle, Oct. 24, 1857.

pursuits, freedom from interest in existing abuses or special knowledge of the arts and sciences concerned in public hygiéne.

In France, on the contrary, provision is made for the introduction of the higher social elements; not only physicians in large proportion, but architects, engineers, veterinarians, and pharmaceutical or analytical chemists—besides *ex officio* authorities and others who are qualified by education, habits, study, or social position—take their appointed seats in the *conseils d'hygiéne et de salubrité* of the several *departements* and *arrondissements*.[5]

Now I wish not to be understood as recommending the introduction of the French system of local councils into this country. I am well aware that they have the disadvantage of being merely consultative bodies, without any power either of initiating measures or of executing them.

Neither do I recommend the fusion of the medical element with the executive. I believe the former takes its proper place when it assembles as a separate body for the purpose of giving advice to the executive body; as, *e.g.*, when the President of the General Board of Health called together a representative Medical Council in London for aid and advice during the last visitation of cholera. The medical practitioners of every sanitary jurisdiction might in the same way be empowered (*e.g.*, in any measure for the regulation of the profession) to elect a Faculty which, among other useful functions, might aid the local administrative body in sanitary matters.

But to revert to the existing system in England. I am far from doubting that many of our local Boards, however strangely constituted, have done much for the improvement of their towns. I grant that the rough-and-ready method of our race often leads to a result much more satisfactory than could have been expected from the process; but it is also no less certain that many remarkable blunders—ludicrous or lamentable, or both—have been committed by the new Local

[5] This is only one of the particulars in which the French Boards contrast with the English. It is marvellous that with a knowledge (?) of such marked differences, any writer in a leading periodical could have penned the following statement:—

"The French system of the administration of hygienic affairs resembles the functions and powers of our English boards of vestrymen under the new Metropolitan Local Management Act."—*British and Foreign Medico-Chirurgical Review*, 1856, No. XXXVI., p. 381.

Boards, and yet more frequently by the older Town Councils acting as Boards of Health.[h] So commonly is this the fact, that among those large classes of society which are not at all represented in them, the general impression is unfavourable to their efficiency. Working people, especially, as far as I can learn, have not the slightest confidence in the existing local administration.[i]

The absence, then, of the educated element, of the commissioned or selected element, and of the voluntary or philanthropic element, must and does leave the mere "owning and rate-paying" elements at a monstrous disadvantage in their administrative efforts—a disadvantage not the less real because they may not perceive or confess it. And the converse is equally true; for the more intelligent, wide-minded and capable are the majorities of local boards—and such are to be found in greater proportion in the larger jurisdictions—the more readily do they acknowledge the advantage of scientific assistance, and apply for direction in important undertakings and emergencies.[j]

I am prepared to show, as I have already shown,[k] legal and constitutional precedents for the introduction of the superior

[h] "Austria never interferes with the local management of towns. An Austrian minister was remonstrated with by a member of the English parliament on the ill condition of one town. The minister acknowledged the fact, but said in despair that nothing could be done for the improvement of the condition of the population: "C'est un mauvais trou; mais que voulez vous, c'est une municipalité."—*Report of Health of Towns Association in "Answers to Questions,"* March, 1848.

[i] A traveller of note arriving at a populous English town which he well knew but had not visited for some twenty years, inquired of a shrewd old labouring man the cause of the singular increase of vile smells which he met with. "Why, sir," was the reply, "d'ye see, they've established a Board of Health here lately, and *that's* the cause of the smells."

[j] Before the Public-Health Act was passed (in 1848) the following remarks were in print. How amply have they been verified since!

"Government direction will not remedy the evil of local incompetency. Unless the constitution of the corporate bodies should be so modified as to work harmoniously with the Central Board and its Inspectors, we must look for a perpetual struggle between the motive power of the State and the obstructive resistance of the Municipalities, in which the latter will generally come off victorious."—*Remarks on Constitution of Authorities, &c.* "Journal of Public Health," 1848, vol. i., p. 156.

[k] The governing boards of the County Infirmaries of Ireland contain a proportion of gentlemen who owe their seats to their voluntary subscriptions. A similar principle was recommended by the Parliamentary Committee on the Medical Charities of Ireland in 1843, and advocated in the debate of 1851 by Mr. Sidney Herbert. I suggested (*Essays on State*

corporate elements, together with nominees of Town Councils and Local Boards, into district courts of larger jurisdictions, comprehending (say) two or three average-sized Registration districts. But my present object is rather to point out the manifest impropriety of still committing extensive powers of local sanitary administration to mere local rate-payers and owners, and to these only in circumscribed and comparatively small jurisdictions.

Local Self-Government.—A few words on what is wrongly termed "Local Self-Government." In the majority of these parochial and town jurisdictions there is nothing of the sort. The parishioners, so far from governing themselves, are governed, absolutely enough, by a few self-appointed leaders—pushing and meddling persons, generally interested in conserving some abuse or upholding some monopoly, who have tact enough to persuade their neighbours, apathetic or absorbed in their own concerns, that their rights and liberties are in danger from a bugbear called "centralization." To assume the existence of independent, disinterested thought and action in such circumstances, is a fallacy. There are, I dare say, some creditable exceptions to the prevalent system of "vestry" government; and I do not mean that the local management of local affairs is, of necessity, a delusion. Far from it. We might, if Parliament pleased, enjoy such a system of local representation as would tend to secure the

Medicine, p. 290), that, in the formation of committees for the management of National Dispensaries, "voluntary benefactions should be encouraged by conferring on subscribers and donors (of a certain standing) the privilege of electing a portion of the Committee, which should bear the same numerical ratio to the nominees of the Guardians, as the total amount of income from voluntary sources might bear to the annual charge upon the poor-rates." Mr. Slaney, also, at the Birmingham meeting, proposed that voluntary contributions should be received in aid of the borough-rates, for the promotion of sanitary improvements and remedial measures. If such contributions—after being continued for (say) three years, to prevent corrupt practices—were to confer the right of voting in the election of local Councillors, the principle for which I contend would be established, and a vast step would be gained towards the full attainment of active and enlightened local management.

Again, the constitution by the Public-Health Act, of the Local Boards of Oxford and Cambridge, concedes the principle of admitting an educated element. And, although there were special reasons for the provision in these cases, there is no reason why a modification of the same principle should not be in general use.

appointment of a very different order of local managers. And if so desirable an approach to the ancient principle of the Shiremote and Witenagemote be ever vouchsafed to this country, we shall be fairly entitled to boast of our English system, and to rely upon it for action in all matters to which it is capable of being applied.

Rate of Mortality Test.—Consistently with those primary defects in our system of local organization, already noticed, was the adoption by the Legislature of a very singular plea for imposing the so-called Public-Health Act upon any district.

It was decreed that unless the inhabitants should voluntarily accept the reform, *an excessive death-rate* must be shown before the Act could be applied.

Now there are, and probably ever will be, various opinions as to what constitutes such an excess in the local death-rate above the minimum or above the average death-rate of the country, as to justify the application of an exceptional law. Hence a further element of discord is introduced.

But, in fact, the public death-rate is by no means a safe or satisfactory test of the rate of public sickness, *i.e.*, of such deviations from the normal standard of health as in various degrees shorten the effective life-time of the population.

It is notorious that vast and sudden augmentations of the number of deaths generally result from attacks of sickness brief in duration. Deaths in a younger population are attended with less sickness than deaths in an older,—in a male population than in a female,—in an agricultural than in a manufacturing community. Thus the ratio of unhealthiness in any *detached* district is not to be determined by its ratio of mortality alone. In local estimates, the deaths of immigrants are by no means to be taken as a certain compensation for the deaths of emigrants;—for some of our healthiest places are selected by hopeful sufferers from hopeless diseases for sanative abodes which prove their graves. But we may allow a general correspondence, in *large averages*, between the ratios of sickness and mortality. This is not the main question at issue. The execution of laws for the prevention of disease ought not to be delayed,—a sanitary organization ought not to be refused, until circumstances have arisen manifestly to shorten human life.

How unaccountable to popular apprehension, how unexpected, have been some fatal outbreaks in places of good sanitary reputation! If, on the invasion of such diseases, a local administrative machinery is wanting, owing to an improvident exemption permitted by what is called a Public-Health Act, the panic-stricken inhabitants have no resource but in hasty, ill-contrived and fallacious measures of palliation. The favoured epidemic carries off its victims, and another untaught generation arises to renew the fatal experiment.

Thus have I endeavoured to point out some of the errors of a partial and exceptional system of sanitary administration, and the extreme danger of leaving the adoption of preventive regulations to the choice of single and separate districts.

II. The insufficiency of existing Laws and Jurisdictions to supply two very important requirements of Public Health.

Firstly,—As to Density of Population, and Localization of Dwellings.

Insalubrity dependent upon crowding.—The modern science of public hygeiology has arisen out of the aggregation of mankind in cities and towns. The necessities, the ignorance, the unconscious improvidence of many generations, in this process of crowding, have bequeathed to us the Herculean task which the sanitary arts can alone enable us to fulfil.

But we apply our sanitary measures to towns *as they stand*. No statesman, no Parliament, has ventured to grapple with the question of re-localizing communities. Viewed in this light, therefore, our sanitary legislation and administration are simply remedial, not preventive. True, they constitute a remedy of the first order, *i.e.*, they remedy a cause instead of an effect. But, as in all other remedial arts, the measures are palliative and curative. For what are our complex plans of ventilation, our costly systems of sewerage, our vast water-reservoirs and aqueducts, but palliatives of a permanent, ever-present cause of mischief?

Let all these remedies be in full operation in any crowded city; let decomposing remains and refuse of every kind be safely and skilfully removed; let a scientific drainage draw

off moisture from the soil and waste-water from the surface; let matters profitable for agriculture be wisely collected, deodorized, and distributed upon the land at sufficient distances; let the river flowing by be protected from defilement; let water of the best quality be freely supplied to every house; let the dwellings be as well-built and ventilated as may be possible in such a space and such an atmosphere; let fires consume their own smoke; let industrial processes of an injurious nature be banished or duly regulated;—I grant all done; immense as would be the social gain of such reforms carried thoroughly into effect, nevertheless, *if the density of population in that city be still in excess*, the air breathed at every instant by every inhabitant will yet remain charged with sure *irritamenta* of disease.

Atmospheric Impurity.—The refuse matter thrown off from the lungs and skin by a multitude of men and animals "in populous city pent," must act injuriously upon each individual of that multitude, though some resist the morbific influence botter than others. It is not simply the deadly gases—carbonic acid, carburetted and sulphuretted hydrogen—for these readily obey the law of diffusion, and mingle speedily with the atmosphere above and around populous districts, under any efficient system of house and street ventilation. But it is chiefly that mysterious "organic matter" of the analyst, real even when unperceived, borne upon mist and fog, inelastic, indiffusible, sticking to walls and furniture, sometimes putrefying, and always waiting to be oxidized in fresh air and sunlight;—that azotic poison which when expelled from living forms hovers and clings about them, carrying and fertilizing the seeds of disease, and seeking readmission into the fortress of life merely to sap and destroy it.[1]

[1] "The existence in the atmosphere of organic matter is, therefore, incontestable; and as it must be most dense in the densest districts, where it is produced in greatest quantities, and the facilities for decomposing it in the sunshine and sweeping it away by currents of wind are the least, its effects—disease and death—will be most evident in towns, and in the most crowded districts of towns.

"It is to this cause, it appears to me, that the high mortality of towns is to be ascribed; the people live in an atmosphere charged with decomposing matter, of vegetable and animal origin; in the open country it is diluted, scattered by the winds, oxidized in the sun; vegetation incorporates its elements, so that, though it were formed proportionally to the population in greater quantities than in towns, it would have comparatively less effect."—*Causes of high Mortality in Town Districts.* Dr. Farr, Fifth Ann. Rep. of R. G., p. 419.

See also the very important evidence of Dr. Angus Smith on the organic matter contained in the air of crowded localities. Appendix, No. III., to Report on Metropolitan Water Supply, 1850, pp. 83—90.

The virulence of this atmospheric poison appears to be in direct proportion to the specific density of population. Ten persons cannot breathe in a given space without ten times the vitiation of air which would result from the respiration of one person in the same space. And the like with other sources of atmospheric impurity arising from density of population. Are we then to stop short at the palliative stage of sanitary progress? Can no advance be made in the absolutely preventive direction? Can nothing more be done, than is now doing so imperfectly, to remove the obvious prime cause of the evil—this heaping together vast crowds of human beings in confined areas?

Facts of Density, Disease, and Mortality.—Let us first look at a few facts of the case, past and present. The area of the metropolitan division of the English population allowed, in 1851, on the average, 30 persons to the acre, or 160 square yards to each of its 2,362,000 inhabitants. But this average allowance of space gives but little idea of the real crowding of particular districts, nor do any published statistics afford any sufficient information on the point. In the East London Union, however, 290 persons are pressed into an acre, allowing seventeen square yards to each,—that is, about one-tenth of the average metropolitan space.[2] Even grouping the four central districts, East and West London, the Strand, and St. Luke, the average is only nineteen square yards to each. In smaller portions of these districts, I am told, the crowding is four or five times as great.

Now Dr. Farr showed long since "not only that the mortality is greater in town than in country districts, but that the mortality of town districts has a certain relation to their density."[3]

The first part of this proposition was supported by the fact

[2] Sixteenth Annual Report of R. G., p. 150.

[3] Fifth Annual Report of R. G., p. 419.

that on an average of four years, the death-rate in a country population of 3,440,500, averaging 0·31 persons to an acre, was 19·3 per 1000, while in a town population of 3,759,186, averaging 8 to an acre, it was 27 per 1000. The mortality in the two classes of population was as 100 to 140. The case may be said to be proved by a more recent calculation on a larger scale. For, the average summer mortality of ten years, 1841-50, was 18·1 in the country districts of England and Wales, with 0·28 persons to the acre, while it was 26·7 per 1000 in the town districts, with 3·84 persons to the acre. The mortality of the two classes of population was as 100 to 147, while fourteen persons were living in the same space in towns as was occupied by one person in the country.[o]

The second part of the proposition was exemplified by the thirty Registration districts of which "the metropolis" was composed in 1841, not including, as now, Camberwell, Lewisham, and Wandsworth. It appeared that in the ten most crowded of these districts, in which the average space for each person was only 32 square yards, the annual mortality of females was 27·7 per 1000,—in the ten of medium density, allowing 102 square yards to each person, the death-rate was 24·4,—and in the ten districts of greatest sparsity, allowing 202 square yards to each, the death-rate was scarcely more than 20 per 1000.[p] Again, during the ten years (1841-50), in eighteen of the most crowded districts, ~~extra-metropolitan,~~ with an average of 6·93 persons to the acre, the death-rate ranged from 28 to 36 per 1000; while it was 27 in thirteen other town districts of the next degree of density, with 2·79 persons to the acre.[q]

Time will not be lost in referring to corresponding facts in two of our first-class provincial towns, of highest density.

In the entire Liverpool district, the population was 116 to the acre in 1851, or 41·7 square yards to each person. But, according to Dr. Duncan's Report in 1843-4, a district in Exchange Ward, containing nearly 12,000 inhabitants, gave a ratio of less than 9 square yards to each person; in a part of the same, with nearly 8000 inhabitants, the average for

[o] British Almanack Companion, p. 161, 1857.
[p] Fifth Annual Report of R. G., p. 422.
[q] British Almanack Companion, *loc. cit.*

each was 6¼ square yards; in one street with 1400 inhabitants, the area was only 4 square yards to each.[r]

He mentioned other populous districts, one allowing 7 square yards, and another 10½ to each person.

Should any one wish to know particulars of the fearful ravages of disease in these spots, let him read that admirable report. It may suffice here to say that from 3 to 5 per cent. of the population of the four most densely-peopled wards were attacked with typhus fever annually, and that the proportion of fever cases reached 10 per cent. in the worst localities. The annual mortality in the same wards was from 33 to 42 per 1000, while the death-rate in other wards was from 24 to 32 per 1000.[s]

Again, in Nottingham, Mr. Hawkesley specified nine sub-districts, belonging to five wards, in which the average space allowed to each resident varied from 11¼ to 8½ square yards, the death-rate in those wards increasing from 23 to 30 per 1000, precisely in the order of their density, and the mean age at death decreasing from 23 to 18 years in the same order.[t] This is a very instructive illustration of the effect of density upon the vital force of a population.

But, for the most conclusive series of facts ever published respecting the relation between human aggregation and mor-

[r] Health of Towns' Com. First Rep., 8vo, vol. i., pp. 155, 156. Dr Duncan has very recently done me the favour to inform me that a decrease in the density of the population of this district has taken place since the Report referred to. This change he attributes "chiefly to the closing of the worst descriptions of cellars, and the limitation of the inmates of the registered lodging houses." He estimates "that the population is less by 1000 or 1200 at the present time." On this estimate, the population of Exchange Ward would now be about 10,580, and the average space less than 10 square yards to each inhabitant.

[s] These averages are only reliable by way of comparison. They were taken in years of confessedly low mortality. The absolute mortality was generally higher. Liverpool still enjoys the unenviable notoriety of the highest death-rate of any place in England.

[t] *Ibid.*, p. 330.

In Manchester, according to Mr. Robertson's valuable statistical Report, presented to the same Commission, "On the Amount and Causes of Death during the three years ending December, 1842," it appears that the several death-rates of the eight townships varied nearly, though not exactly, with their respective ratios of density. In the following Table, compiled from facts in that report, Salford and Chorlton appear as exceptions to the general agreement of the two columns; but their exceptional character is

tality, I must refer you to the Registrar-General's Sixteenth Annual Report.[u]

Population Movements.—We may digress briefly to compare the foregoing English rates of density with those of a great continental city. Michel Levy states that in Paris, the area allowed to each inhabitant of three *arrondissements* was from 12 to 14 *mètres* (*i.e.*, from 14¼ to 17 square yards), or somewhat less than the space allowed in the more crowded London districts. In 1832, the population had accumulated to such a degree, that in some quarters 1500 persons were located upon one *hectare*, allowing only about 8 square yards for each inhabitant. Well might the Parisian Cholera Commission remark—"*On oserait à peine confier mille arbres au même espace de terrain, si l'on tenait à les avoir sains et vigoureux.*"[v]

I am aware that extraordinary changes have been recently made in the location of the Parisian population;[w] and similar changes, though slower and to a less extent, are now progressing in London and the larger provincial towns of England. To these changes I beg your particular attention. Entire blocks of wretched and closely-packed city dwellings have been levelled. Streets and courts of the viler sort of houses have been swept away. Large hives of the lower hangers-on of

explained by the report itself, Salford having a worse-conditioned population than either Chorlton or Hulme.

Manchester Townships, arranged in order of density of population.

	Persons to an acre.	Mortality per 1000.		Persons to an acre.	Mortality per 1000.
Manchester.....	103·90	33·5	Ardwick	21·07	28·4
Hulme	61·32	29·6	Pendleton ...	6·41	24·5
Chorlton.....	40·48	25·6	Cheetham ...	5·49	18·0
Salford	32·40	30·9	Broughton ...	2·83	16·3

[u] See Appendix (A) to this Address.

[v] On this M. Levy remarks: "A un tel état de choses il n'est qu'un remède: aggrandir la cité, ouvrir des rues, établir des places, abaiser les maisons, élargir et éparpiller la population; chaque habitant doit jouir au moins de 40 mètres carrés de terrain" (*i.e.*, 48 square yards, or 100 persons to an acre).—*Hygiène Publique*, vol. ii., p. 572, *Paris*, 1850.

[w] "The vast improvements executed in Paris by the Imperial Government have demolished many thousands of the habitations of the poorer classes, and driven them from the centre of the capital to the suburbs. Even there houses are not to be found for these multitudes; and we are assured on good authority, that during the last winter, rents have been paid to the owners of land near the *barrières* for permission to encamp without the walls, and thus strange settlements of these Bedouins of civilization have been formed round the most polished and splendid city in Europe."—*Edinburgh Review*, No. 214, p. 353.

town life have been forcibly dislodged. But, in these movements of population, no adequate provision has been made for the proper accommodation of the expelled population in more open and more improvable localities.

Metropolitan Model Dwellings.—Extensive and lofty model buildings have, indeed, been erected here and there in the heart of London and in a few provincial towns—especially by the Metropolitan Association for Improving the Dwellings of the Labouring Classes.

Great pains have been bestowed upon the scientific construction of these buildings. Means of thorough ventilation and purification, and a fair cubic space in the rooms, have been secured. Many minor arrangements have also been made for cleanliness, comfort, and economy. That veteran in the cause of Public Health, Dr. Southwood Smith, in a clear and forcible exposition of this benevolent project,[x] mentions one very important feature—namely, that the charter granted by the Crown to the Metropolitan Association "is framed on the principle, that the object not being money-getting, but philanthropic and national, the profits, after the payment of a moderate rate of interest, instead of going to increase the amount of dividends, should be applied to the extension of the scheme."[y]

And the success of their great experiment is established, we are told, not only by the general healthiness, decency, and regularity of the occupants, but by a very low annual death-rate, especially among children. But I confess that I do not accept the published statistical results as a test of the sanitary success of a scheme which has so recently come into operation. At first, the general death-rate in the several "Dwellings" of the Metropolitan Association, according to Dr. Southwood Smith, was 13·6 per 1000 on an average of three years. It

[x] "Results of Sanitary Improvement," by Dr. Southwood Smith, London, 1854 (pamphlet).

[y] It is quite refreshing to meet with any instance of actual protest against the money-getting schemes of pretended sanitarians. Although attorneys and capitalists may lawfully get up joint-stock companies to supply gas, water, dwellings, pure food, products of sewerage, or any other material commodity, to the public, with the object of securing the highest possible dividend to their shareholders; it is nevertheless mere quackery and hypocrisy to profess, in such schemes, to be actuated by philanthropical motives, and to appeal to the public for support and to the State for protection on philanthropic grounds.

then sunk for one year to 7 per 1000. Since that time it has slowly increased, and according to the last Annual Report (Thirteenth) the death-rate has risen to 20·6 per 1000. This increase deserves special notice.

Taking the four *larger* sets of dwellings for families, with a population of 1707, the death-rate was 23·4 last year; while in the six *smaller* buildings, chiefly for single men, with a population of 471, it was only 10·6 per 1000.

The earlier inhabitants of these model lodgings would naturally belong to a better-conditioned order of working people. Their selection of such dwellings would indicate the possession of a higher taste, greater frugality and temperance, and more adequate means of livelihood, than the average of their class. Besides, the ratio of mortality in any small and isolated population, as I have before said, is, and must always be, a fallacious test of its ratio of unhealthiness.[a]

As the gaseous and organic products of exhalation arise through the many stories of lofty buildings, we know from recorded experience that the inhabitants—those of the uppermost rooms at all events—are exposed to additional risk of foul air; and I do not think it possible that the "vitiated-air shafts" of the model dwellings can fully obviate this evil. Undoubtedly, the occupants of large blocks of this sort, situated in the heart of a crowded city, must breathe the contaminated atmosphere of the district. The currents of "fresh" air come from the centre of the metropolis, and have therefore been polluted before they circulate in these densely-peopled dwellings. There must therefore be a defective vital force, a low standard of health, arising from defective aeration of the blood in these as in all other crowded communities.[a]

[a] A large proportion of the deaths of working people in London occurs in its vast hospitals. Doubtless, some of the sick in the model dwellings have been received into these institutions, and some may have died there. These deaths should be included in the calculation. They cannot fairly be set off against the deaths of any inmates shortly after admission into the "dwellings," for the latter are probably balanced by the deaths of those who have left the model dwellings to die in other private houses.

[a] "The *halitus* [*i. e.*, the breath and perspiration of men and animals], cannot be diminished in quantity [the specific population continuing the same]: but the isolation of families in separate houses tends to prevent its accumulation; while the collection of persons in Robert Owen's parallelograms, and in public institutions, barracks, large schools, prisons, and workhouses, must necessarily lead to the concentration of the respiratory excretion."—Dr. Farr, *loc. cit.* p. 427.

Now it is to be observed that the condensation of the population is promoted to an amazing extent in these buildings. We have seen that in the very worst parts of Liverpool in 1843-4, the amount of superficial space to each resident was 4 square yards. The Metropolitan Association allows only $4\frac{1}{2}$ square yards; for Mr. Ross shows, from their Reports, that they propose to cram 2820 human beings into six sets of buildings upon areas (including open yards) which measure altogether only $2\frac{3}{4}$ acres.[b] On all accounts, therefore, we shall do wisely to wait until the experiment be longer tried and its elements better sifted, before we pronounce upon its sanitary success.

The social aspect of this well-meant scheme is not without a cloud. One of the best and noblest features of English life is its domesticity. In the manufacturing districts, indeed, family responsibilities, even home attractions and comforts, seem to be spurned by the majority of the artizan class;[c] but, throughout the greater part of the kingdom, an English family is still, I hope, an isolation of mutual interests and duties, hopes and fears, joys and sorrows, with which no stranger can intermeddle. The cœnobitical life of the Continent seems to be incompatible with that wholesome social reserve which lies, I believe, at the foundation of our national greatness. It is difficult to concieve how large communities of families in single houses can long maintain that separate domestic existence, which seems essential to the maintenance of the national character, and which renders absolute freedom of speech and action in this country so safe to the Government, while in other European states it is found to be so dangerous.

I wish not to be misunderstood with respect to the plans and projects of the Metropolitan Association, and of its affiliated societies in provincial towns. I gladly admit that they have effected great improvements in the house-accommodation of the working classes, and that the apparent results, moral and physical, are at present satisfactory; and I hail the prospect of more extended efforts of the same kind. For in enormous cities like our metropolis and first-class towns, a certain pro-

[b] 12,735 square yards.—"City Dwellings," p. 10. London, 1857.

[c] See a very interesting paper by Mr. J. S. Wright, "On the Employment of Women in Factories at Birmingham," read at this meeting, and since published in the Birmingham Journal.

portion of work-people must be located near centres of population and depôts of commerce; and where space cannot be procured for separate cottages, nothing better can be done than to erect commodious and skilfully-planned blocks with many tiers of apartments. These are particularly suitable for single men, though it appears that single men are not, as yet, so ready as families to take advantage of them. But if, as I shall endeavour presently to show, a far superior principle of localization can be brought to bear upon a much larger proportion of workmen and their families, the present erections of the Metropolitan Association would then take rank merely as secondary and auxiliary expedients. Nothing is more likely to injure the just reputation of these projects than the indiscriminate zeal of some of their supporters.[d]

Necessity for New Building Laws.—In our parsimonious use of land for buildings, we have neglected a most important sanitary regulation—namely, the separation of houses. It was a law of the Twelve Tables, one in force during the best days of Rome, that no two houses, whether the *Domus* of the nobility, or the *Insulæ* of the common people, should touch. A space of not less than 5 feet was to be left between them. But in our great cities we are not satisfied with uninterrupted lines of houses, the adjoining sides of which are double or treble the extent of the open backs and fronts. We also prevent the possibility of postern ventilation, by a *dos-à-dos* arrangement,—two parallel lines of the worst class of dwellings being often in actual contact, and seldom allowing more than the narrowest and darkest interspace for back-yards between them. Here again is shown the urgent necessity for Building Laws of a more reformatory character than the best of those which are now in operation in our large towns.

State of Suburban Districts.—Certain movements of population now in progress depend not so much on the march of architectural improvement, or even on the conversion of town dwellings into warehouses and commercial establishments, as

[d] One gentleman, at the Birmingham meeting, contended that large buildings of this kind, accommodating many families upon flats, with a wide common staircase, realized all the sanitary advantages and maintained all the family distinctness of isolated cottages with garden plots. Those who have studied the results and tendencies of both systems may be excused for thinking that he had prejudged the question.

on the rapid increase of these town populations from rural immigration, and the mushroom growth of an inferior kind of dwellings, in neglected suburban districts.

For, externally to our limited sanitary jurisdictions, lie belts of border land, beyond the reach of municipal rule, and defying the interference of rural magistrates and guardians,—refuges alike for the outlaws of urban civilization, and for the nomads of the country, and therefore tempting fields for the wild speculation of unscrupulous builders. I need not attempt to describe the miserable state of this debateable ground. My attention was long ago drawn to the vastly inferior sanitary condition of suburban, as compared with either strictly *urban*, or strictly *rural*, populations. Subsequent reports resulting from independent observations, and a recently published exposition of the state of the Metropolitan Suburbs, have confirmed my original statements.[e]

How, then, are we practically to deal with these outlying districts, such of them at least as admit of profitable improvement, so as to prepare them for the safe occupation of the masses who require removal from the foul centres of crowded districts?

In the first place, as I have said, they should be included with the rest of the country in sanitary jurisdictions. More extensive powers should be entrusted to the official and scientific superintendents of these districts; and a different description of local Boards should be established for their management.

But, secondly, more direct interference is needed on the part of the State. The question of locating anew large groups of population, is by far too wide and too serious to be handled by merely local authorities.[f] To abandon these wanderers, hanging upon the skirts of civic regulation, to accident or to the unchecked speculation of the harpies who make them a prey; to leave them to their own utterly

[e] See Report on Mortality of Gloucester. "Journal of Public Health." 1848.

[f] "The removal of population from the overcrowded to the unoccupied parts of the earth's surface is one of those works of eminent social usefulness which most require, and which at the same time best repay, the intervention of Government." (*Mill's Political Economy.* Vol. ii., p. 542.) The learned author in this passage and its context is treating of colonization, but many of his arguments apply with equal force to new settlements in old countries.

inadequate resources in such momentous affairs as the selection and preparation of sites, and the construction of dwellings, until (if ever) the cautious capitalist is ready to supply their better-educated demand, would be a national blunder of such magnitude, as to entail in the long run the punishment of a national crime. Meanwhile, a great social crisis may occur; and when the time for moderate measures of prevention may have passed, the very persons who now cry out most loudly against State interference, would be the first to denounce the Government for past supineness, and to drive it into arbitrary and desperate measures.

National Interference justifiable and practicable.—Sound political economy would, I believe, justify national intervention in this state of things. Such legislative provisions as are now in force for aiding the drainage of the broad acres of the landowner, might apply equally to the advance of capital for the erection of well-ordered suburban villages for the labouring poor. For the promotion of useful national undertakings, by the Commissioners of Public Works, the Treasury is empowered to issue Exchequer Bills, or to advance large sums out of the Consolidated Fund.[g] And the well-known ingenuity of Chancellors of the Exchequer might be profitably employed in devising the most advantageous methods of providing for the first outlay upon extensive though highly remunerative social improvements, which for many reasons could be safely and effectually conducted only under the immediate direction of Government; unless, indeed, district authorities could be constituted of a very different kind from those now in existence, under far stricter responsibility to the State, and acting in far wider areas of jurisdiction.

At all events, no expulsive process, no forcible extradition of the poor, should be permitted in towns—perhaps not even stringent prohibitory laws against undue crowding, however desirable their object, should be enforced—until the State, or the capitalist under legal sanction and control, shall have supplied proper accommodation for the scattered and homeless

[g] See "An Act to authorize the advance of money out of the Consolidated Fund to a limited amount for carrying on public works and fisheries, and employment of the poor, and to amend the acts authorizing the issue of Exchequer Bills for the like purposes." 5 and 6 Vict., c. 9.

thousands. I grant that private enterprize will surely follow in the wake of advancing public requirements; but a general demand for superior accommodation cannot be expected to arise among the working classes, until they witness the happy experience of those who have already benefited by a better supply.

Even if large national advances were required for the inauguration of such a reform,—would a people which unhesitatingly sacrificed twenty millions in one vote merely to shorten the duration of a Colonial Slavery certain of extinction,—a people which no less willingly spent eighty millions in two years to protect a distant ally, and to adjust an hypothetical balance of power in Europe,—would such a nation, I ask, refuse a bold outlay to effect a thorough social reform *at home*, a reform which must incalculably increase the happiness, security, and wealth of the whole community? I cannot bring myself to believe this of my countrymen. All that we need is the directive mind.

Suggested Formation of New Home-Settlements.—Instead, then, of expending million upon million in rendering densely-peopled districts more safely habitable, let the dispersion of the compressed masses be cautiously and gradually promoted.

In the first place, let open and elevated spots, of good soil, climate, and water supply, be selected for occupation. A dry and bracing soil—as sand, gravel, limestone, or sandstone—rather than moist productive ground, a hardy herbage rather than a rank luxuriant vegetation, should guide the choice of locality. I mention elevation specially, because it may not be generally known that scientific observation and medical testimony, at home and abroad, have hitherto concurred in establishing the truth of the proposition, that, *ceteris paribus*, the liability of any place to sickness (zymotic attacks especially) varies inversely with its altitude above the sea-level; while in the interior of countries, the effect of such altitude is modified by the comparative elevation and the configuration of the surrounding land-surface. I have never known or read of a single instance of apparent exception to this law (and such instances are very rare) which might not be reasonably accounted for by exceptional circumstances, belonging to the spot, *e.g.*, by the ascent of pestilential exhalations or

mephitic gases from the lower levels where they are generated, to the higher levels where they operate. Such ascent may be favoured by prevalent winds or peculiar atmospheric currents; and it is sometimes traceable to badly-constructed and ill-ventilated sewers. In the latter case, no one qualified to investigate the causation of disease would attribute to elevation that insalubrity which plainly belongs to defective engineering.

In choosing a site for settlement, one would carefully eschew, even in land of considerable elevation, hollows or depressions which cannot be swept by invigorating breezes, or in which water and organic deposits settle and decompose. Equally to be avoided are places exposed to winds from malarious districts, even if far distant.

Having wisely selected the site, and skilfully prepared the ground for building, let wide streets of detached double cottages, not more than two or at most three floors in height, be erected, at intervals sufficient to afford, on the average, 80 square yards of surface to each inhabitant. Estimating five persons to a family, or nearly eight to a house, a rood of land would thus form the ground-plot for every double cottage. This would give eight houses and sixty persons to the acre. But, if possible, additional space should be allotted for roads and other public purposes.

To complete the project, let railway transit be provided, on fresh lines if necessary, and of a simpler and far less expensive kind than that now afforded by Railway Companies, for the conveyance of working people to and from the commercial depôts or manufacturing establishments, where they may be employed. Under recently-discovered economical processes, without reckoning on future improvements in steam locomotion, the total cost of railway conveyance need not equal the difference between the rent of a rural cottage and a set of rooms in some confined and miserable town-dwelling.[h]

[h] I am informed that the work-people in the metropolis can rarely procure two indifferent rooms for less than 4*s.* 6*d.* or 5*s.* per week. A good cottage within ten miles of the General Post Office, might be built to let at 2*s.* 6*d.* or 3*s.* per week. But it by no means follows that the whole of the difference need be spent upon the railway journey. By the use of coal in smoke-consuming engine furnaces instead of coke, one great step has been recently gained in the economy of railways. It is not at all unreasonable to look forward to penny fares for several miles on single lines. And with the Parisian example before us, of a broad and most commodious subterranean railway, under the *Boulevard de Strasbourg*, connecting all the great lines from the country, and opening into the vast cellars of the new *Halles* (central markets), no one can deny the possibility of railway communication with the very centres of our metropolis and largest towns.

Yet, in the face of such facts and probabilities, an eminent civil engineer, at the Birmingham meeting, ventured to denounce the suburban-village scheme as utopian, because he thought no railway terminus could be brought within reach of city labourers, and no railway fares within their means! One is directly reminded of George Stephenson's triumph over the "impossibilities" of his contemporaries.

In new suburban settlements of this kind, the city workman would possess his little plot of garden,[i] the charm of the English cottage, while his own vegetable produce would both economize and improve the diet of his family. Such a village would not long remain the abode only of the labouring classes. Its order, regularity, and sanitary advantages would tempt other sufferers from a town life, in easy circumstances, to join the thriving community.

Trade and manufacturing industry would rapidly follow in the wake of the new emigration. But all insalubrious processes would from the first be subjected to safe and approved regulations, such as, even in France, are with difficulty applied to established concerns. Public buildings—for worship, for education, for the cultivation of the arts, sciences, and literature, and for innocent recreation—on spaces of sufficient extent to display a noble architecture, would soon adorn the new settlements. This expansion of living masses, so far from injuring old centres of population, would react most beneficially upon them. Relieved of their fatal congestion of human life, they would be enabled, without destructive sacrifice of property, to expand their thoroughfares, to clear away their dark courts and alleys, and thus to rival their young and vigorous offshoots in the progress of social improvement.

Then would the minister of religion and the public educator no longer find a people wholly inaccessible to christian teaching and intellectual culture. The minister of health would no longer turn in dismay from his almost hopeless task of sanitary inspection and instruction. No longer would the rigid statist be able to enumerate the perio-

[i] Small garden-plots adjacent to cottages are far preferable, in every respect and for obvious reasons, to large tracts of garden allotments, often at a long distance from the homes of the tenants.

dical increase of a stunted, ill-developed, anæmic and degenerate race,—men unfit alike for severe feats of labour at home, for supremacy in colonization, and, as compared with the stalwart recruits of a past generation, for the military defence of their country. Communities thus located and thus progressing would supply far fewer inmates for the hospital, the workhouse, the penitentiary, the prison. The diminished cost of disease, crime, and pauperism, would be followed by diminished local taxation. At all events, without overstating the case, man would have something like a fair field for his ceaseless—although, thank God, not hopeless—conflict with physical suffering and moral evil.

Secondly,—As to the Conservation and Purification of Rivers.

Perhaps there is no more hopeful feature in the sanitary prospects of this country than the recent and sudden increase of public attention to the state of our Rivers and Water-courses; although it must be confessed that, in the earlier stages of the Public-Health movement, this branch of the subject was strangely neglected.

There are two points of view from which the river question may be regarded; one concerns the management of rivers and their tributaries with reference to the natural drainage of the land; the other, the protection of rivers from defilement by man. It is almost impossible in practice to distinguish this twofold aspect of the case, yet a few remarks may be appropriately made under each head.

River-Conservation and Regulation a duty of the State.—The exclusive idea (noticed in an earlier part of this paper) arising out of the limitation of preventive measures to populous places with boundaries, has in turn led to the neglect of wide tracts of water and watered land, beyond the favoured regions of municipal government.

Probably, at no period of our history has so little practical attention been bestowed upon the channels, banks, and mouths of rivers. There is abundant evidence of the fact, that five centuries ago, the authority of the Crown was in active operation for the removal of surface and stagnant water, the prevention of floods and the maintenance of the free flow of

running waters. But, at the present day, although we may hear occasionally of the drainage of some marsh or fenny district, how seldom does the praiseworthy effort commence, as it ought, in rectifying the course, the bed and the discharge of the neighbouring stream! How much costly labour might be saved,—how much profitable ground reclaimed, by first setting in order the main natural drain of the district![1]

To regulate the channel of a river, to maintain the integrity of its banks and the proper fall of its bed, and to secure the freedom of its outlet, would be to work out a great idea, for the realization of which, as an affair of Government, we must look back to old Rome, where the appointment of "*Curatores Alvei et Riparum*" by Augustus preserved the course of the Tiber, during the empire, from that fatal injury which befel it in the middle ages, and from the increasing obstructions of modern times.

The only plea put forward in our day and country for any administrative interference with rivers, is the want of greater facilities for navigation; and measures for the promotion of this important object are often opposed to the natural design of these ancient channels. For, the formation of weirs, locks and embankments, to secure a greater body of water for vessels of large burden—unless steps are at the same time taken to deepen the bed of the stream—may seriously obstruct the watershed of the surrounding district. In some instances, no doubt, it may be desirable to arrest the current and augment the volume of water in motion, even for sanitary and general purposes (as where large surfaces of mud might otherwise be exposed in dry weather); but as a general rule, no check ought to be imposed on the freedom of discharge from the surface and ditches of alluvial valleys and plains.

It is no business of mine to enter into details on the subject of river-engineering. Such a task belongs to men of another profession. I know that it is a large and difficult question, and that its practical treatment must differ widely in localities differing in their physical characteristics. In mountainous districts and near the sources of great rivers, it may often be necessary to retain flood waters, and to form

[1] Are not these remarks applicable to expensive improvements now being made in the Plumstead and other marshes bordering on the circuitous and obstructive wanderings of the lower Thames?

lacunar reservoirs, so that by diminishing the rapidity of fall, destructive inundations at lower levels may be prevented. The Rhone flood of 1856 is a case in point, and the preventive project since promulgated by the French Government deserves careful study. But in England, with its humid atmosphere and retentive soil, the main *desideratum* in river improvements is to maintain the freedom of the natural area of drainage, and to increase the rate of aqueous descent. It should not be forgotten that the channels of rivers are always liable to deterioration from physical causes in constant action. The tribute of solid matter, which they continually convey from the high places of the earth to the wide domain of ocean, tends as continually to clog their current and to delay their ultimate fusion with the primæval waters, while their descent is often more directly and suddenly interrupted by casual infalls of trees and their own excavated banks.

Viewing rivers, therefore, merely as appointed outlets, to be maintained and regulated by the skill and enterprize of man, for the discharge of water from extensive areas of land, some of which, even in this island, contain many thousands of square miles,—I hold that no existing local jurisdictions are competent to deal with them. No local authorities, acting within a narrow boundary, can be qualified to undertake the care of a body of water, which merely flows through their little territory—its origin and termination being remote, at all events beyond their limits of authority.[k]

Whether or not river jurisdictions could be created of so extensive a character as that each might embrace all the channels and tributaries of one main stream from its sources to the ocean, and whether several smaller and separate jurisdictions over the same family of waters would be of much avail in their proper conservation,—are questions on which I do not venture without further information to speak decidedly. But it should be recollected that the Crown has never wholly surrendered its rights and property in *tidal* rivers; and if these rights had always been jealously guarded for the public benefit, or rather if the fundamental principle on which they rest had

[k] Mr. J. S. Mill, specifying many cases in which Government interference is customary and advisable, mentions "raising embankments to keep rivers in." This, of course, involves other details of river conservancy. (Political Economy, vol. ii., p. 345.)

been uniformly recognized, a far larger proportion of running waters would have been brought under public management;[l] and the Legislature would scarcely have sanctioned such a measure as the "Thames-Conservancy Act" of last session, in which the antiquated but ill-founded claims of the Mayor and Corporation of the City of London to the bed, soil and shores of our principal river, have been admitted to the extent of constituting a majority of the new conservators from members of that corporation.

Dr. Acland's remarks on this subject so entirely accord with my own views, that I may be excused for endeavouring to strengthen my case by an extract from his excellent work on the Cholera at Oxford (p. 114):—"I have long been satisfied that until the Government take in hand the waters of the Thames Valley as a whole, Oxford will never be adequately drained, and the city [other towns and villages, also, on the banks of the river] will not reach that acme of salubrity which it is reasonable to hope for, and proper to strive to obtain. * * * * * If private interests and local convenience are to regulate the outlets of the chief waters of the country, the country at large must bow to their convenience, and suffer still, as it has hitherto suffered. If, on the other hand, the Thames reverts to what it was created to be, the great uninterrupted, undammed water-course of the south-east of England, then the Thames' valley may, under judicious management, become one of the chief gardens of England, and its perfectly regulated waters and irrigated ground may supply vast quantities of cheap food, profitably raised, to the metropolis. To effect this necessary change, fresh powers by new unfettered legislation are imperatively demanded."

Protection of River-purity.—Here we are at once met by the mischievous results of an erroneous system of town-sewerage. The sparkling rivulet, the crystal stream, the majestic river—pure sources of health, plenty and refreshment—have been, of late especially, used unscrupulously for the vilest purposes. As if the poisonous products of factories, chemical processes, gas-works and mills of every kind, were not sufficiently defiling

[l] The Health of Towns' Commission in 1845 recommended that the Crown should be empowered to define natural drainage-areas, and consequently the limits of their respective jurisdictions.

to Nature's beneficent supply of the second great necessary of life, we cast in yearly more and more of the decomposing animal and vegetable refuse of our cities, villages, and public institutions.

In haste to get rid of the filth of towns at any sacrifice, and with indiscriminating hostility against every method of its removal, except drains and sewers opening into natural water-courses, the *excreta* and all the refuse of a populous district have been most unwisely and unjustifiably permitted to mingle with the rain-fall and the surface discharge. This evil is vastly on the increase. Civil Engineers, naturally enough, are ready to solve the difficult problem committed to them, in the most obvious and apparently economical manner; because they are apt to look upon it merely as an engineering question. They allege (perhaps too hastily) that there is no other practicable method of getting rid of the material *débris* of human society. And they too often ignore the first principle of town purification, namely, the separation of matters profitable for agriculture from mere waste-water. Then, as might have been foreseen, the local authorities, the municipalities, and Parliament itself, are at a stand, because there is no discovered method of destroying the venomous hydra—a literal rather than a metaphorical hydra—which they have created.

Morbific results of Sewerage into Rivers.—Engineers and chemists frequently urge the self-purifying property of running waters; but there are known limits to that power, and we have good grounds for asserting that, with an enormous excess of organic matter in suspension, such disgusting deposits will unavoidably take place in the bed of a stream, and such abominable emanations arise from its evaporating surface, as must render it a fatal source of pestiferous *miasmata* to all the dwellers upon its banks and traders upon its waters.

Besides, water may be thoroughly deodorized without being disinfected; and a most important element in this discussion is the result of Dr. Snow's able researches concerning the influence of water mixed with sewage upon the diffusion of Cholera, a result confirmed by the rigid inquiries and conclusive reports of the Registrar-General and the General Board of Health.[m]

Knowing well that the general decay of health and abbreviation of life caused by foul river-water are continually augmenting, and with the moral certainty that the specific germs of the most fatal pestilence of modern times are thus diffused, we are justified in protesting against any further committal of this department of Public Health to any administrative authorities in which the medical and physiological element does not predominate.

I cannot avoid a momentary digression on the practice of referring unsettled questions in any art or science connected with the Public Health to gentlemen whose education and pursuits have been devoted to the cultivation of some other art or science. Thus, in sanitary controversies, we find Engineers descanting on the ætiology of disease and mortality, Lawyers on medical measures, and Doctors on the shape, capacity, and material of drains. On no social question is there so much of the "sutor ultra crepidam." There may be some advantages in the mutual checks afforded by extrinsic remarks upon professional conventionalities, but they can hardly compensate for obvious disadvantages; and the irregular practice leads to unmethodical, if not to mischievous, results.

To revert to my subject. The course generally adopted in public sewerage has aroused a very powerful obstructive interest against town improvement. Landed proprietors very naturally resent the injury inflicted upon their property and those employed upon it, by the increasing debasement of rural streams, which, before the sanitary movement, were comparatively pure. Hence, also, it has lately become the fashion to decry the value of town manure, for no other reason that I can perceive, but because its important volatile constituents have been so dissipated in air, and its solid organic matter and salts so immensely diluted with water, that their recovery for industrial and commercial purposes has become next to impossible. But the fertilizing elements of this manure, ammonia and the phosphates, have still their market value.

[m] See Dr. Farr's Letter to the Registrar-General (17th Annual Report). Also Mr. Simon's most instructive Report on the two last Cholera Epidemics, as affected by the consumption of impure water.

They are advantageously employed in several places, and the tardy agricultural demand for them is now on the increase. These being admitted facts,—are we reduced to the humiliating confession that our chemical knowledge and engineering skill and commercial ingenuity are unequal to the task which the physiologist and the economist would impose? Must we still turn our rivers into common sewers? Or, as some humorous sanitarian has proposed for London, shall we send its sewage, worth annually half a million sterling, to feed the fishes at the Nore?

If there ever were a case for State interference, surely this is one. It is unreasonable, in my opinion, to require any municipality, however large and wealthy, even the richest in the world, to solve, at its own expense, a problem which intimately concerns the welfare of the whole kingdom. If costly experiments are made in populous districts, which may be ultimately rendered valueless by later improvements in the collection and distribution of town manure, it is hard that these enterprizing communities should be left to bear the sole burden of the outlay. Tentative efforts of this kind, I admit, befit a powerful and wealthy people: they are evidences of prosperity and progress. But, when clearly experimental, their cost ought not to be wholly thrown upon local taxation. No greater discouragement could be inflicted upon the advance of this great question, than to impose upon one generation of residents in any town the necessity of defraying the whole expense[o] of a plan for distributing its products of sewerage.

THIRDLY,—AS TO THE PRINCIPLE OF STATE INTERFERENCE IN AFFAIRS OF PUBLIC HEALTH, AND THE LIMITS TO SUCH INTERFERENCE.

In the foregoing remarks upon two matters of serious moment to the whole community,—namely, the selection of sites for habitations and the management of rivers,—my object has been to show that there are affairs of national importance connected intimately with the care of the Public Health, which cannot, prudently or even rationally, be abandoned to local or voluntary arrangements, and which have not hitherto

[o] It is satisfactory to perceive that the Public-Health-Act-Amendment Bill of last Session contains a provision for extending the period for the repayment of capital borrowed for town improvements from 30 to 50 years. Why not to 60 or 80 years?

received anything like due attention from the legislature and government of this country. They might be added, as indeed they rightly belong, to the category of cases for legislative interference which that accurate logician, Mr. J. Stuart Mill, propounds[p] as coming within the limits of the province of government.

The grounds, on which he defines the boundaries between voluntary action (whether by individuals or by associations) and the intervention of government or public law, bear so closely upon questions of sanitary regulation, that I deem it not out of place to lay before this Department a brief summary of his arguments and illustrations, using, when convenient, his own terms and expressions, and adding a few additional illustrations in special relation to our subject.

Limits to Central Action.—Mr. Mill sets out by distinguishing between two kinds of government intervention; the one *authoritative*—by prohibiting, directing, or controlling individual action in certain things; the other, *auxiliary*—by giving advice, promulgating information, and establishing certain agencies for correct procedure, without prohibiting individual action.

He justly decides that the former kind of intervention has a much more limited sphere of legitimate action than the latter, which may generally suffice for objects of public utility, and involves no irksome or degrading restraint. He shows the importance of protecting from oppression the opinions of minorities, and the extreme necessity of surrounding individual independence of thought, speech, and action, with the most powerful defences, especially in states popularly or democratically governed, where majorities are ever ready to impose their views and even tastes as laws binding upon minorities and individuals.[p]

[p] "Principles of Political Economy," Book V., chap. xi.

[p] "In this country, however, the effective restraints on mental freedom proceed much less from the law or the government than from the intolerant temper of the national mind; arising no longer from even so respectable a source as bigotry or fanaticism, but rather from the general habit, both in opinion and conduct, of making adherence to custom the rule of life, and enforcing it by social penalties against all persons who, without a party to back them, assert their individual independence."—*Ibid.*, vol. ii., p. 506.

He admits that a better organization of government, and a more scientific application of the principle of division of labour to the state machine, would greatly diminish, if not entirely remove, the force of any objection to multiplying the duties of government in all fit undertakings. He urges, nevertheless, the superior advantages of individual and competitive agency in many affairs which might not be so wisely and well done by government agency. He dwells strongly on the importance of cultivating habits of self-reliance and spontaneous action in matters of collective interest,—of promoting intelligence, activity, and public spirit among the governed, and of demanding as much of them in the way of social effort and co-operation as they are in any respect equal to perform.

Objects for Central Intervention.—With all the preceding reservations in support of the *laissez-faire* principle, he makes the following weighty exceptions in favour of some mode or degree of intervention by the authorized representatives of the collective interest of the state.

First, In cases where the consumer is not a competent judge of the commodity,—as in those provisions which do not simply consist in ministering to personal inclinations, nor in serving the daily uses of life, and the want of which is least felt where the need is greatest. Here, he enforces the propriety of intervention in matters which tend to raise the character of human beings, the uncultivated not being competent judges of cultivation. Thus, education is one of those things which a government may provide for the people. And, by a series of conclusive arguments, he proves it to be the duty of the state to establish elementary schools, accessible to all the children of the poor, either freely or for a payment too inconsiderable to be sensibly felt.

For precisely the same reasons, I hold it to be the duty of a government to provide proper sanitary instruction and medical care for the poorer classes of society, in well-defined districts. The argument, however, does not apply equally to a provision of drugs for the sick poor, because a supply of mere materials involves other questions both of political economy and of medical practice.

Secondly, In cases where persons are incapable of acting or

judging for themselves, as lunatics and idiots; children also, because parental power is as liable to abuse as any other power, and because freedom of contract, as regards the labour of those who are legally called infants, is but another word for freedom of coercion;—the lower animals also, because such cruelty and tyranny as it would be the duty of a bystander, if strong enough, to prevent by force, it cannot be less incumbent on society in general, *i.e.*, the state, to repress by law and severe penalty. Under this head of intervention, Government regulates, on sanitary principles, establishments for the reception and care of the helpless classes of society.

Thirdly, In cases where individuals attempt to make irrevocable contracts for future and distant times, the law may interfere by granting them release from such contracts, if found to be oppressive, on a sufficient case being made out before an impartial authority.

Fourthly, In cases where joint-stock associations and powerful combinations require to be controlled for the protection of individual and public interests. Here, as also in a "Letter to the Metropolitan Sanitary Association" (Feb. 15, 1851), the learned writer shows that gas and water companies are virtual monopolies—competition being next to impossible—and are more irresponsible, and unapproachable by individual complaints, than the Government. The community needs some other security for the fit performance of the service than the interest of the managers, which may be to make the article dear and bad. It is the part of Government, therefore, either to subject the business to reasonable conditions for the general advantage, or to secure for the public the profits of the monopoly. This applies to the case of a road, a canal or a railway, which are in a great degree practical monopolies. The state should either reserve to itself a reversionary property in such public works, or should fix, and if expedient vary, the maximum of fares and charges. And in all these provisions the state should impose stringent regulations for the personal safety and health of those who use them. Mr. Mill advises that gas and water should be supplied by the municipal authorities of a town, and the expense defrayed, as even now it is in fact, by a local rate. But then he considers no municipal government to be complete without an accredited representative on the part of the general government, one of

the duties of which is to hold the local government to the performance of its duties, by superintendence and if necessary by legal compulsion.

Fifthly, In cases where an object generally beneficial and desirable cannot be attained without legal restrictions upon those who would endeavour to profit by opposing it. For instance, the law may justly limit the hours of factory labour, lest a minority, disposed to make immediate gain by working beyond the time agreed upon by a majority, should prevent the general voluntary adoption of the shorter time, and thus virtually compel the majority to abandon the reasonable object of their wishes. Also, in colonization, the state acts wisely in placing a rather high price upon unappropriated lands, lest they should be prematurely occupied, the colonists unduly dispersed, productive labour lost, and thus the progress of the colony in wealth and civilization be retarded.

Sixthly, In cases where acts, done or omitted by individuals and over which the Government claims control, have important effects upon the interests of others and of the community; as in public charity or the relief of the poor; and again in colonization, as well as in all large movements of population from crowded to unoccupied localities.

Mr. Mill, however, appears to have overlooked the principal reason for legal or governmental interference in the foundation of colonies; namely, that it is a paramount duty of the state to protect the lives and health, not only of its citizens, but also of its emigrants and settlers, and thus to prevent the degradation of their race. *Salus populi suprema lex.* Yet this great unwritten law of society has been violated with the permission, tacit or express, of government, by almost every enterprising body of English settlers, whenever at will or fancy they have appropriated vacant territory, or selected sites for habitation, or established depôts of commerce.[3] Ignorant of the effects of surrounding physical agencies upon the structure and functions of the human body, and eagerly intent on the

[3] "Of all European nations who have planted distant settlements, the English have invariably shown the least regard to the proper selection of localities for their colonial cities; and this must, in general, be ascribed to the commercial spirit taking the exclusive lead."—*Topographical and Historical Notice of Calcutta, by J. R. Martin, Esq., F.R.S.* London, 1847, p. 7.

acquisition of wealth, they have generally neglected to secure those conditions of soil, altitude, and climate which lengthen the life of man, and invigorate his frame and faculties. Injurious, however, as have been the effects, physical and moral, of this neglect upon the settlers and their descendants, the mother country has had ultimately to suffer the full penalty of her blind adherence to a mistaken policy.

Seventhly, In cases where important public services are to be performed, which cannot be made to remunerate the persons who perform them;—as voyages of discovery; the erection and maintenance of lighthouses and beacons; and especially scientific researches, the cultivation of abstract or speculative knowledge for the public benefit, and philosophical experiments which require a long and continuous devotion of time and attention. The latter cases have been strongly urged by the Parliamentary Committee of the British Association; and with them should be included statistical investigations, which are most safely and accurately performed in appointed districts and by appointed persons subordinate to a central department for collecting and compiling facts and distributing information, as *e.g.* the General Register Office, the operations of which might be extended with great public advantage.

Extension of the principle of central action.—Readers of Mr. Mill's great work may have noticed that in some of the cases adduced as suited for government intervention, he mentions the insufficiency only of individual and voluntary action; but his arguments generally apply with equal force to small corporate action, even if legalized, as indeed he has elsewhere admitted with respect to cases under the fourth preceding head. For, the orders and regulations of local boards and corporations, irresponsible to Government, are liable to greater defects, and their administrative acts to greater abuses, than the decisions and acts of official and responsible persons. Hence the necessity of extending the province of governmental action, by way of superintendence and control, in all matters which affect the general welfare of society.

Again, there are two classes of cases, not mentioned in Mr. Mill's category, which obviously belong to it, and which therefore I shall venture to number accordingly.

Eighthly, In cases where acts done by local bodies affect the

interests of minors and of posterity; as in the expenditure, on great public works, of capital borrowed by mortgage of the local rates.

Ninthly, In cases where acts to be done of benefit to the nation at large or to entire provinces, cannot be performed by the corporate authorities of local jurisdictions owing to the limited extent of those jurisdictions; as in the location of new communities and in the conservation of great rivers,—cases of which I have already treated at length.

III. The importance of instituting a corps of highly qualified district officers, subject to a supreme council, for the administration of the department of Public Health.

Firstly,—Concerning the appointment of Scientific Officers for advice and aid to Local Boards.

Existing Arrangements.—The course pursued in recent legislation, with respect to these appointments, has been, to say the least, a singular one.

Instead of a general organization of Health-Officers, securing their responsibility to the state and to society at large for the due performance of their high functions, and thus providing something like a counterpoise to the obstructive influence of parochial cliques and local cabals; these appointments have been literally left to chance. An institution (if it may be so called) which might, under amended laws, confer inestimable benefits upon the community, has been exposed to the injurious operation of every circumstance calculated to pervert its integrity, lower its dignity, and impair its efficiency. The principle of *laissez-faire* has been deliberately applied to these appointments, in disregard of forewarnings and advice by persons who were competent to form a judgment on the subject,[1]

[1] Among others, Mr. J. Ranald Martin, when Health of Towns' Commissioner in 1844, thus emphatically recorded his opinion, in his very able Report:—

"In place of the present costly and defective system of local law, and local administration, we should have improved laws, and competent and responsible persons to see them carried out, and to superintend the health concerns of all towns and populous districts,—persons of proved capacity, and altogether independent of, and unconnected with, local influences. Of the absolute necessity of independence of local influence and authority, on the part of Health-Officers, we have an emphatic example in Norwich; after describing a public nuisance, Mr. Johnson candidly states as follows: 'I am acquainted with many more; but it is obviously improper to make any direct reference.' It is quite clear, then, that any supervision, to be useful, must be altogether free from, and irrespective of, local influence.'"—(Health of Towns' Commission, Second Report. 8vo. Vol. ii. p. 119.)

and in utter heedlessness of the consequences of somewhat similar arrangements in the German States.[1]

It can hardly be necessary for me to explain—although to prevent being misunderstood I do so at once—that my remarks on the Health-Officerships of this country apply exclusively to the system, and in no way to the officers themselves. On the contrary, I feel it to be a gratifying duty thus publicly to offer a tribute of praise to those zealous and scientific sanitarians, who, undeterred by a crude and erroneous system of local administration, have come forward manfully to do their best, and have already effected more than could have been anticipated, considering the terms of their tenure of office under metropolitan and provincial Boards.

Recent enactments and their operation.—Two different methods have been adopted by the legislature.

In provincial districts under the Public-Heath Act, the appointment is merely permissive. In the metropolis, under Sir B. Hall's Act, it is compulsory, but without any provision for its efficiency. In both, however, the salary is directed to be paid out of the district rates, and its amount to be determined by the local Board. In the metropolis, these Boards have absolute power to appoint and remove. No general instructions of a scientific authority, no medical laws are permitted to interfere with the peculiar views and proceedings of any vestry or district Board. It is, however, much to the credit of at least one of the metropolitan Boards, that it delegated its right of choice to a committee of able and impartial men of science. But of the manner in which these elections were conducted in most of the metropolitan districts,

[1] A very instructive precedent was afforded by Prussia, where, after the choice of the *Stadt-Arzt* and the *Kreis Physicus* had been for many years left to municipalities and local authorities, and after these offices had assumed more of an inspecting and preventive character, the mode of appointment, by local patronage, was found to be so liable to abuse and so unsatisfactory in its results, that the government was compelled to take the matter into its own hands and to nominate the officers.—See *Essays on State Medicine*, p. 301.

I will say nothing here.[1] In the country at large, the appointment and dismissal are subject to the approval of the General Board, and the latter is authorized to issue directions as to the duties and qualifications of the officers of health. This task has been admirably fulfilled by the present General Board, in their Instructional Minute of Dec. 20, 1855. An unsuccessful result, however, might have been safely predicted. The "Minute" is virtually a dead letter. No local Board pretends to judge of the performance of the long category of duties and responsibilities indicated in that paper; no officer of health is paid for performing them; except in rare instances, no official co-operation is legally secured to him in his efforts to obtain accurate information as to the extent and localities of public sickness, the number and nature of the cases of disease. The aid to be afforded to him by subordinate officers is entirely at the option of the local Boards, and is by no means generally enforced. I have much pleasure in exempting from this criticism the Liverpool appointment, which was made on totally different principles, and with the happiest effects.

Qualification for the office.—Then, as to the scientific qualifications which, according to the excellent minute of the General Board of Health, are requisite for the proper performance of the duties of the office,—there is no scientific tribunal nor examining body nor Inspector to test the candidate's special knowledge of pathology, vital statistics, chemistry, and natural philosophy. Of course, it was not assumed that the ordinary medical and surgical licences could afford any guarantee for the possession of such special qualifications. And they therefore stand in the official document, not for immediate adoption, but as memoranda for future legislation.

Both the Public-Health Act and the Metropolitan-Management Act direct that the Officer of Health is to be a medical practitioner. A false view of the office is thus, in the outset, presented to the public; for, in this country, a practitioner of medicine merely means one engaged in the treatment of disease, and therefore local Boards naturally look out at once for leaders in curative practice. Hence the favourite family

[1] See *Essays on State Medicine*, p. 395.

doctor of the more active and influential members of the Board has the best chance. The influence of the ladies tells immensely in these elections, and an aspiring accoucheur, if he deems the office worth his acceptance, is the most likely person to obtain it.

There are so many reasons why the successful practice of the curative art is irreconcileable with the faithful discharge of the duties of the Officer of Health, that after long consideration I am more strongly than ever convinced that the law ought absolutely to prohibit this functionary from undertaking any private professional engagements. I am borne out in this conclusion by the opinion of the chief provincial Officers of Health with whom I corresponded in 1854. The only kind of medical occupation which on a sound system would be open to these officers, is of a *public* description, as suggested in the Instructional Minute, to which I refer always with so much pleasure. Connexion with a hospital or medical school is, for the reasons given in that document, rather a recommendation than otherwise to the candidate.

When one considers the strictly scientific character of many of the engagements which would so becomingly devolve upon the Officer of Health, the simple official nature of others, and his statistical, analytical, and inspecting duties,—one is almost tempted to ask whether he need be medical in any sense save that of being medically educated. But then we are reminded of the imperfect and anomalous condition of medical education in this country, its great defect of preliminary or University training. We feel that we have lost hold of a great educational principle. For in the ancient University system, as Professor Whewell has so well explained, the Faculty of Medicine included all subjects of mental culture connected with the material world and the properties of its component parts.[a] We see that this principle is not duly recognised in the favourite Medical-Reform Bill of the day, and especially that no provision is made therein for examination in the higher departments of sanitary science, *i.e.*, in preventive medicine and medical jurisprudence. We find

[a] "For medicine in its original and comprehensive sense, as one of the great divisions of human culture, must be considered as taking in the whole of physical science."—Whewell's "Elements of Morality and Polity," vol. ii. p. 321.

that the power of testing every description of medical qualification is to be handed over to colleges of practising physicians, surgeons, and apothecaries. No provision is made for a high degree or diploma corresponding to the peculiar functions required of a Health-Officer. The philosophical reformer shrinks from the prospect, and anxiously inquires whether there is any hope that the measure, which was previously recommended by the Committee of the House of Commons, and introduced by Lord Elcho, may receive a fairer consideration in the coming Session. Whatever may be the defects of the latter measure, it at least recognised the connexion between sanitary and medical science by placing the Minister of Health at the head of the Medical Council.

I touch on this matter in order to call attention to the very important mutual relations between these two departments of State Medicine, and I venture to predict that no general measures of public hygiéne will effect their desired object, unless accompanied by, and in some degree based upon, a sound measure of medical education and organization.

Necessity of an independent position for the proper performance of certain duties.—On the various duties and responsibilities of the Officer of Health, I need not now enlarge.*

With regard to his functions of statistical inquiry, he ought certainly to be responsible to the state rather than to the locality. The noble President of this Section, while occupying a similar position last year at the British Association, clearly laid down the sound administrative principle, that the collection of statistics in all departments is properly an affair of Government. And I am happy to observe that the application of this principle to a national system of meteorological observations, has been recently enforced by the learned President of that Association at Dublin.†

* These matters are fully treated of in my "Essays on State Medicine"; and many of them are shown to belong to posts of physical, rather than of medical, science,—in a paper presented to the Council of the British Association, the greater part of which is reprinted, as Appendix B to this Address.

† "Meteorological observations on land exist in great numbers. In Prussia, in Russia, in Austria, and in Belgium, such observations are organized under Government direction, or at least with Government support. In other parts of Europe, as in Britain, the labour is left to individuals or scientific societies.

"What is needed is to give unity to these isolated labours—to connect them with one another, and with the results obtained at sea; and the first step to this seems to be, to give them, in each country, that permanence and uniformity of system which can only be insured in measures adopted by the State."—The Rev. Dr. Lloyd's Opening Address. British Association, Dublin. 1857.

With respect to medico-legal duties, there can be no doubt that a scientific Officer of Health—in independent position, trained in the study of forensic medicine, and expert in its practice—would supply a notorious and daily-felt deficiency in our system of Medical Jurisprudence. As the referee of the Coroner's Court, and of the Police-Magistrate, he would prove a valuable substitute for those unmethodical and unskilful investigations which, while expensive to the community, and non-remunerative to medical men, too often disgrace this department of State Medicine, and destroy public confidence in the science on which it rests.

Again, with regard to the dwellings, the occupations, and the food of the people, there are inspecting duties, the free and energetic discharge of which would prove of the utmost advantage to the public health, and in the execution of which no amount of intellectual superiority or of sanitary knowledge on the part of the officer, could compensate for his being placed in a false social position. Whatever might be his official experience, however great his tact and caution, the object of his appointment could not be realized, unless he were made independent of local or class influence.

In sensitive alarm lest scientific agency should be unduly subjected to state direction and government authority, we have almost forgotten that more powerful hindrance to the conscientious discharge of the higher order of preventive medical duties,—caused by official thraldom to local bodies, which, if containing members sincerely and intelligently desirous of improving the sanitary condition of their district, nevertheless also represent every kind of interest opposed to sanitary control.

It is impossible to shut one's eyes to the facility with which scientific opinions may be procured (I fear I must say purchased) on either side of any question, involving on the one hand, the public safety, and on the other, private or corporate investments. I might allude to some strange defences of obvious infractions of the laws of Public Health, which have

been recently put forth by adepts in science, but I forbear. A good cause will not ultimately suffer by skilful counterpleas. There may be moral and social causes for these obliquities beyond our reach. But the liability to error, from this perversion of science, deserves the deepest consideration of the Statesman; and we may fairly ask the Legislature to frame such laws and to found such institutions as are calculated to unfetter the judgment and fortify the decision of the scientific authority.[x]

I am not suggesting a new and untried course. It has been most successfully followed in England with respect to the higher offices of the Legal Profession. Probably in no part of the world is the independence of the judicial function so anxiously, so delicately, guarded. Thus, even the local Judges—those of our County Courts—are appointed, not by the Crown, nor by the People, but by the Lord Chancellor.[y] They are paid by the Treasury. And yet further guarantees for the unbiassed exercise of their independent powers are now called for by able law-reformers.

If the Legislature has done wisely in committing the appointment of Health-Officers to local governments, it must have adopted an erroneous course in depriving local governments of all control over County-Court Judges. It is not a whit more necessary to guard the latter from popular or representative influence than the former. Nay, the larger the jurisdiction of the office, the less danger is there of bias from petty obstructive interests and local abuses. In short, if the Officers of Health are on a right footing, let us by all means adopt the American polity and leave the executive and judicial, as well as the legislative, elements of government to the direct popular choice!

While I protest against the subjection of scientific officers to local Boards, I should be equally unwilling to expose them to the corruption of political patronage, or to the oppression of a central despotism. There may be official organization without

[x] Are there many, under the depressing influences to which I have referred, to whom we may safely apply Horace's trite yet apposite lines?

"*Justum et tenacem propositi virum*
Non civium ardor prava jubentium,
Non vultus instantis tyranni
Mente quatit solidâ."

[y] See "Essays on State Medicine," p. 315.

political thraldom; and few will deny that an organized corps, under legal protection and state responsibility, must exercise a far more permanently beneficial influence upon society, than any voluntary combination which scientific men may be driven to make in their own defence. For example, in the Metropolis, the only method which the Health-Officers could adopt to secure any approach to uniformity of action, community of experience, and mutual support, was by a voluntary Association. Good service this association has already done, but experience forbids us to hope that it will permanently maintain its hold upon all its nominal members, or that its mere moral force will long operate upon the public.

The idea should be kept constantly in mind, that the Officer of Health, in the unbiassed and unfettered exercise of his inquiring and inspecting functions, would be the guardian of the working classes, under the disadvantages to which they are too often exposed in their dealings with the trading and the employing classes. To the poor, he would be the minister of health and social safety, while, in friendly intercourse with the manufacturing and commercial classes, he might procure such ameliorations in the condition and employment of their work-people, as no arbitrary and compulsory laws could possibly effect.

I am persuaded that we do not try the hortatory method enough in sanitary administration. Precautionary measures are either left to the option of unwilling and incompetent Boards, or they are forced upon an uninformed people by crude and unpopular compulsory enactments.

Let us endeavour to substitute a skilled agency labouring in a missionary spirit, and the harvest of social amendment, I confidently predict, will be a hundred-fold.

Extent of Sanitary and Statistical Districts.—With regard to the extent of district, which might come under the superintendence of each Officer of Health, I am not disposed to suggest any positive limits. Area and population would be only items in the estimate. If the institution of this office were combined with the formation of new local Courts, acting in more extensive jurisdictions than those of the present local Boards (as suggested previously), existing territorial divisions would of course be respected; but the social characteristics of the population, and especially the physical features of the

district, should also aid in determining the boundaries of jurisdiction.*

I have no doubt that my original estimate of 300 Health-Officers, for the whole of England and Wales, might include those for the Metropolitan districts; and perhaps a somewhat smaller number might suffice. But considering all that might be done, and ought to be done, by such a *corps* for the public good, I strongly recommend that the average population of each official district should not exceed 70,000 or 80,000; nor would the duties of such a district be practicable, unless the law provided for the organized co-operation of the medical officers of union-districts and parishes.*

We must bear in mind that the establishment of a staff of scientific Health-Officers by the State, is quite a distinct question from the creation of new local bodies for the management of enlarged sanitary jurisdictions. The former (an official organization) might co-exist with the present singular medley of local jurisdictions of all sorts and sizes. Each officer might be appointed to act in a regulated number of them, and to do his best to keep the various managing bodies to their duties. There is nothing impracticable in such a scheme, although it is doubtless inferior to a thorough reform of local administration in harmony with official appointments.

The notion that any proposal to salary 200 or 300 superior district-officers, either out of the Consolidated Fund, or out of a national rate, (however or by whomsoever brought forward) would never be entertained by Parliament and the public, is, I hope, a mere conventional fallacy. It depends probably on another fallacy—that there exists no precedent in England for such a proposal. Yet the objector forgets that more than £100,000 is contributed yearly from the national fund to aid

* This subject is more fully treated of in my paper on the "Territorial Distribution of the Population," reprinted as Appendix (C) to this Address.

* When any one steadfastly urges the institution of a new order of offices, he is often supposed by a charitable public to have an eye to one of the posts for himself. Now, as such a suspicion, in the present instance, might injure a good cause—at least, among persons who are glad of the silliest excuse for shirking the consideration of any great public responsibility—the writer deems it right to say, for the information of those to whom he has not the honour of being known, that his habits and pursuits wholly unfit him for the duties of a Health-Officer, while his professional position quite precludes any desire or attempt on his part to obtain such an appointment.

Boards of Guardians in paying the beggarly salaries of their medical officers. If simply *curative* medical duties among a sixth part of the population costs the state so large a sum, beside a heavier charge upon the local rates, what rational objection can be made to devoting double that sum to a *preventive* medico-sanitary service for the benefit of the whole population? Such an objection is indeed far worse than irrational. Its source must be more discreditable than mere ignorance; and if made by a Statesman who really understands the subject, we may safely conclude that he fears to risk either his hustings popularity, or his place, by proposing or supporting so wise and so beneficial a measure.

Secondly,—Concerning a Government Board.

A satisfactory solution of those large and unsettled questions of State Medicine, which I have laid before this Section, will very much depend upon the course which may be taken by the legislature, with respect to the permanent institution of a central authority.

I can scarcely believe that the common sense, not to say the cultivated intelligence, of the people, can be much longer deceived by the outcry against normal administration, under the nickname of centralization; an outcry which, if honest, must proceed from utter inconsideration. For no reasonable, well-informed person would venture to deny that a vigorous national effort is required for the due and effectual attainment of our objects, and that no great national effort can be made without unity of purpose and combination of agency. A central office is as necessary an element of any system of polity, as a local executive Board. But, if the local authorities are wisely constituted, if they are aided by deliberative scientific councils and by a well-trained and independent *corps* of officers, their influence among a free and educated people would effectually control any tendency to arbitrary dictation in the central department.

It would be a waste of words to argue with those who, disgusted with our puny and abortive attempts at sanitary legislation, hastily exclaim against any state intervention, any comprehensive code of Public Health,—who imagine that all may be safely left to the wider diffusion of knowledge, and to

the unguided exercise of the individual will,—but who thus shut their eyes to the history of man, who forget the natural tendency of our race to social degradation—to mental and bodily deterioration—when not upheld by the divine principle of Order, and who ignore the proved fact that law and government are indispensable to civilization. My business is not with such speculators. They must, if consistent, call for the abrogation of every sanitary law now on the statute-book.

I take it for granted, then, that constituted authorities are absolutely necessary for the administration of sanitary laws, and that the government must directly or indirectly control the execution of those laws. The objects and limitations of central intervention have already been discussed in this paper;[b] and the remaining practical question, therefore, may be thus stated.

Ought the Central Board to form a distinct department of Government, under a Minister of Health? in other words, should the powers of our existing General Board of Health be extended and its constitution perfected?

Or shall we ask for the mere employment of scientific agents under the Home Office; as, for instance, in the administration of the Burial Acts, which appear to be carried into operation quietly, efficiently, and, as far as I know, with general satisfaction?

Or, thirdly, shall we support the recent government proposition for the constitution of a Committee of Privy Council for Public Health? This would be analogous to the Committee for Education to the Board of Trade, and to the Judicial Committee of Council.

Much doubtless might be said in favour of each of these courses. I am incompetent to state the case properly for or against either of them. But I may be allowed to say that the objections to the second plan seem to me to be very forcible, if not insurmountable. Granting that some one subordinate and peculiar department of public hygiéne, as the burial of the dead, has been well-managed, under the Home-Secretary (our Minister of the Interior), with a staff of scientific inspectors,—it by no means follows that all the complex and vast questions of sanitary administration which are now afloat and wait for a legal anchorage, ought to be cast upon a

[b] See pp. 38—44.

department of government which is said, by those whose position and experience entitle them to give an opinion, to be already over-burdened with the variety and magnitude of its affairs. But neither the first nor the third of the courses indicated is necessarily open to this objection; and the national choice probably lies between them. I may observe that the third is by no means a novelty, for a Committee of Privy Council acted as a General Board of Health, under the name of a Quarantine Board, long before the present General Board of Health was established. The Privy Council is still the Quarantine department; and its Board of Trade is the authority against the importation of cattle-epidemics. Also, it is Her Majesty in Council, who now calls into action the occasional powers of the General Board of Health, under the Diseases-Prevention Act.

We may however, I submit, best fulfil our duty as a voluntary deliberative assembly, by simply pressing the claims of science and its followers to be fairly represented in any central Board or Council, whatever may be its legal form or constitutional relations.

The science of medicine, in the comprehensive view of it taken by Professor Whewell, is not adequately represented by the mere employment of its professors as agents of the governing body. Unless they sit as coadjutors in the supreme court, they cannot take that share of public responsibility which the public interests require them to possess.

If, on the one hand, the powers and constitution of the General Board of Health and the General Register Office should be extended, connected, and adapted to all the exigencies of the Public Health, we might reasonably suggest that at least one scientific person, eminent in his particular line, should be appointed to the superintendence of each of the several departments of sanitary action and sanitary investigation which might be committed to such a Council.

I know of no other method by which the confidence and inward respect of subordinate officers and the public could be secured; and without such confidence and regard, no system of sanitary administration could stand.

If, on the other hand, Her Majesty's Most Hon. Privy Council should be selected by the legislature for the supreme control of matters affecting the Public Health, we should be

wanting in reverence to science, if we omitted to claim, for her more distinguished representatives, equal honours and powers with the Lords of that Council. This proposal involves no more than the adoption of a principle in force in almost every continental state,—namely, the introduction of the medical element on equal terms, not merely into provincial and local boards, but into the highest councils of the realm.

The office and title of Privy Councillor would not more gracefully adorn the representative of science, than would his own intrinsic qualifications ennoble that office and titular honour. And in the Privy Council, also, the division of a medico-sanitary Committee into sections would be almost indispensable for the effective supervision of the several branches of this subject.

Any such official recognition of sanitary science would, in all probability, act most beneficially upon the general administration of public affairs.[c] Great social questions would seldom be handled without due reference to their relations with the Public Health. Education, emigration, agriculture, manufacture, municipal institutions, popular representation, and jurisprudence (beside war) would all have their recognized sanitary aspects.

There is, perhaps, no fact of the times which strikes an earnest sanitarian more forcibly than the defective estimate, taken in this country by many persons of high intellectual culture, of the bearings of the Public-Health question upon other leading questions of the day. Whatever may be the causes of this prevailing misapprehension, one of its symptoms is manifested, plainly enough, by objections—all the more positive as they are unsupported by argument—against the establishment of a Ministry of Health, as one of the chief departments of the State.[d]

Yet, whether a General Board of Health, or a Committee of Privy Council, be ultimately selected for the superintendence of matters included under Public Health, we may be

[c] The medical element in the Executive would be far more efficient than in the Legislative department of the State.

[d] See what an influential reviewer says thereon, and be prepared for similar assertions in Parliament:—"The so-called Ministry of Health is an essentially subordinate [!] office, involving no questions of general policy [!] except those which relate to the original organization of the system."!!—*Saturday Review*, February 23, 1856.

sure that these affairs will not assume their real relative importance in the State, until there is a Cabinet Minister at the head of the entire department, who would be responsible to the country for whatever central action might be necessary in any of its sections, and through whom all projects, acts, and reports of the directors or officers of those sections would come before Parliament.

While thus suggesting topics worthy of consideration by those who are so much better qualified to form a judgment on them than myself, I confess that I am not sanguine in my expectations of legislative interposition. What Parliament and the Government might do is one thing;—what they will do is, I fear, another.

So strong must be the inducements, so various the motives, to get rid of an arduous and thankless responsibility, by delegating to local assemblies, not only absolute power to initiate and direct, but even to reject, "troublesome" measures of civic regulation, that no one need wonder at the favour which the extravagant demands of the "local-self-government" party meet with in high quarters. Not that it would be at all unreasonable to call for an improved system of district administration by wisely-constituted local councils. But I believe that such a system of management, although doubtless best adapted to accomplish every social object which can be effected by separate communities of the same nation, has never been proposed in a definite form to the legislature.

Looking upon this question as a whole, and reflecting upon the many, though not insuperable, difficulties which beset its re-adjustment, I am almost inclined to say with a distinguished public servant and literary character of the day:—

"One who with competent knowledge should consider well the number and magnitude of those measures which are postponed for years, or totally pretermitted, not for want of practicability, but for want of time and thought; one who should proceed with such knowledge to consider the great means and appliances of wisdom which lie scattered through this intellectual country—squandered upon individual purposes, not for want of applicability to national ones, but for want of being brought together and directed; one—who, surveying

these things with a heart capable of a people's joys and sorrows, their happy virtue or miserable guilt on these things dependent, should duly estimate the abundant means unemployed, the exalted ends unaccomplished—could not choose, I think, but say within himself, that there must be something fatally amiss in the very idea of statesmanship on which our system of administration is based; or that there must be some mortal apathy at what should be the very centre and seat of life in a country—that the golden bowl must be broken at the fountain, and the wheel broken at the cistern."*

* Taylor's Statesman, p. 160.

APPENDIX.

(A.)—Notes on Density of Population in relation to Mortality.

From the Tables published in the Sixteenth Annual Report of the Registrar-General (pp. 142—153).

1. As to the eleven Registration Divisions of England and Wales. The two of greatest density, London and the North-Western, are those of highest mortality. On the other hand, the four of lowest mortality show all a density below the average.

2. As to the forty-four Registration Counties, excluding the Metropolis. Lancashire, the most crowded, shows by far the highest rate of mortality. Four others, Staffordshire, Warwickshire, Cheshire, and the West Riding, in which the death-rates are above the average of England, follow in the order of density. There are, however, three counties, Cambridgeshire, Monmouthshire, and especially the East Riding, in which the mortality is above the average and the density below. Probably the co-existence of very dense and badly situated groups of population, with large tracts of waste land in these counties, may account for their exceptional character.

The two counties of most sparse population, North Riding and Westmoreland, show the lowest county-rate of mortality.

3. As to Registration Districts, taking each county separately. Surrey (extra metropolitan) (1), and Sussex (3), display a low death-rate in almost all their districts, of which the more populous are, for the most part, inhabited by persons in circumstances above the average. In Kent (2), not reckoning the sanative resorts of Tonbridge, Ramsgate, Margate, and Dover, which, though among the most populous (in the summer season), show for obvious reasons a low death-rate —the four of greatest density, Gravesend, Medway, Maidstone, and Canterbury, suffer the highest mortality. In Hampshire (4), the three, Southampton, Portsea, and Alverstoke (including Portsmouth and Gosport), are the highest, both in density and mortality. In Berkshire (5), Reading stands first in both respects. Middlesex, *extra metropolitan* (6), seems favourable to longevity throughout, probably for the same reason as Surrey. Uxbridge, however, the second most crowded district, has an excessive death-rate.

Hertfordshire (7), and Buckinghamshire (8), with a generally low average of mortality, are not remarkable for density in any district; but the worst places, here as in other counties, are often included in the widest districts, and thus the facts of the case do not appear. In Oxfordshire (9), the University City takes the lead both in density and mortality. So in Northamptonshire (10) does the county-town district. The districts of Huntingdonshire (11) call for no remark. In Bedfordshire (12) the county-town district shows the highest mortality. In Cambridgeshire (13), a very high rate of mortality in one rural district, North Witchford, is accounted for by the marsh malaria. Next to that, Cambridge takes rank for mortality, as it is first in density. In Essex (14), the Orsett district has a high death-rate, due to its fens. Setting that aside, Colchester stands first, both for density and mortality. So in Suffolk (15), does Bury St. Edmunds. So in Norfolk (16), do Yarmouth, Norwich, and King's Lynn. So in Wiltshire (17), does Salisbury, remarkably. In Dorsetshire (18), setting aside Weymouth as a watering-place, Bridport has the highest density and death-rate. In Devonshire (19), this double distinction is attained to a remarkable extent in Exeter, Plymouth, Stonehouse, and East Damerel. Cornwall (20) may boast of a low rate of mortality throughout the districts, although there are five of rather more than average density. The Bath district is pre-eminent in Somersetshire (21), both for crowding and for mortality. In Gloucestershire (22), Bristol is far a-head in both respects. Clifton and Gloucester stand next in order of mortality, and would do the same as to density, if the numerous rural parishes of the Gloucester districts were omitted. Cheltenham, though above the average density, is below the average mortality, but, like other watering-places, it may be considered exceptional. Herefordshire (23) is favourable throughout. In Shropshire (24), the Shrewsbury and Madeley districts are above the rest, both in density and in mortality. In Staffordshire (25), the case is striking; the seven most populous districts, Newcastle, Wolstanton, Stoke-upon-Trent, Wolverhampton, Walsall, West Bromwich, and Dudley, alone show excessive death-rates, and these nearly in the order of their respective densities. In Worcestershire (26), Worcester and Stourbridge prove the rule. In Warwickshire (27) also, Birmingham, Nuneaton, Foleshill, and Coventry, stand first in both respects. Aston, in Birmingham, seems exceptional, probably from an excess of the more wealthy classes. In Leicestershire (28), the county-town is sadly conspicuous for both crowding and a high death-rate. Little Rutlandshire (29) ranks fairly in both columns. The Lincolnshire (30) districts are so constituted as to give no marked results, but they are of low mortality in general. In Nottinghamshire (31), the chief town stands by far the highest in the death-rate as in density; but the suburban district of Radford seems to follow the exceptional case of Aston near Birmingham. In Derbyshire (32), the county-town again takes the same double first-class. So in Cheshire (33) do Stockport and Macclesfield. In Lancashire

(34), fatal county, the several districts establish the canon of density and mortality in a very striking manner, as may be seen by the following table:—

Lancashire Districts, 1841—50, in the order of their Specific Population.

	Acres to a person.	Death-rate in 1000.		Acres to a person.	Death-rate in 1000.
Liverpool	·01	36	Wigan*	·66	28
Manchester	·06	33	Preston	·78	25
Salford	·06	28	Warrington and Leigh	·89	26
Oldham	·21	26	Burnley	·92	23
Barton and Chorlton	·27	25	Prescot	1·14	23
Ashton	·35	26	Chorley	1·26	22
Bury	·40	25	Ormskirk	3·06	20
Bolton*	·41	27	Fylde	3·56	18
West Derby	·42	26	Lancaster*	4·01	23
Blackburn	·53	25	Ulverstone	4·71	18
Haslingden*	·58	22	Garstang	4·87	16
Rochdale	·61	24	Clitheroe	5·05	19

Dividing these 24 districts into 3 groups, the 8 of greatest density show a mean average death-rate of about 28½ per 1000; the 8 of medium density, 25 per 1000, the 8 of lowest density, 20 per 1000.

The West Riding of Yorkshire (35) contains districts differing most widely as to specific population. Leeds stands first in crowding as in mortality. Sheffield and Bradford follow next in both columns. In the East Riding (36), Hull, Sculcoates, and York take rank in regular succession as respects both density and mortality. In the North Riding (37), there is no district, except one with a hospital, in which the death-rate reaches 21 per 1000; and there are only three out of fifteen in which there are less than five acres on the average to each person. The Durham (38) districts show Sunderland, South Shields, and Gateshead at the head of both columns, though not in the same order. Northumberland (39) confirms the rule, Newcastle being first and Tynemouth second in both respects. Carlisle and Whitehaven head the Cumberland (40) districts in both columns, though in different order. Westmoreland (41) gives no exception to the rule. The Abergavenny district in Monmouthshire (42), the Merthyr Tydfil district in South Wales (43), and the Wrexham district in North Wales (44), are at the head, respectively, both in density and in mortality.

* The disproportionately high death-rates of Bolton and Wigan need explanation, as does the comparatively low death-rate of Haslingden. The apparent sparsity of population in Lancaster depends on the wide extent of country included with the town in the Registration district.

A general survey of these facts leads to conclusions which are verified by careful examination of the figures in the Registrar-General's tables.

1. The northern half of England, notwithstanding its comprehension of two remarkably open and healthy counties, is on the whole in a worse condition as to salubrity—judging from its higher rates of mortality[b]—than the southern half.

2. There is a far more marked contrast between the manufacturing and the agricultural districts; the loss of life and health being at least a third greater in the former than the latter.

3. Considering the mixed character of most of the districts, the wonder is that the indisputable connexion between density of population and mortality should not have met with a greater number of apparent exceptions.

4. When to this examination of statistical records we add the startling conclusions so ably laid before the Birmingham meeting by Mr. Jelinger Symons, with reference to density of population and CRIME, the proof of a social cause common to both physical and moral evil seems to be complete.

(B.)—ON THE LOCAL ENCOURAGEMENT OF SCIENCE BY THE STATE.

In reply to a question, mooted at two anniversaries of the British Association for the Advancement of Science, and circulated among the members of its General Committee, in August, 1856,—

"Whether any measures could be adopted by the Government or Parliament that would improve the position of science and its cultivators?"

Before offering any suggestions of my own I wish to express my unqualified assent to the principal propositions which have been already made by eminent persons, and embodied in the printed reports of the Parliamentary Committee of the British Association; . . . . . but the object of the following suggestions is to endeavour to show that the Government and Parliament might, with equal reason, be called upon to establish and maintain, in every district of the kingdom, an organized system of scientific investigation and statistical record in the various departments of natural science,—those especially which bear obviously and practically upon the moral and physical welfare of the masses of society.

At the last meeting of the British Association, Lord Stanley, in

[b] The death-rates of the four northern divisions of England and Wales are—21, 22, 23, 27; of the four southern, 20, 20, 21, 25; of the extreme eastern and western, 20 each; and of the midland, 22 (the average of England).

his excellent address to the section of Economic Science and Statistics, clearly laid down the principle, that the collection of statistics in all departments is essentially an affair of Government. In this opinion, I most fully concur. Private labourers in the field of statistical research, however earnest, influential, and intelligent, are generally deterred from a continuous prosecution of their investigations, partly by the great expense attending upon casual and isolated efforts, and partly by impediments and objections frequently raised against what has been called "the meddling of unauthorized individuals."

I have elsewhere remarked upon certain defects in our national records of *vital* statistics, owing to—1, the want of accurate verification of original facts; 2, the want of properly-defined spheres for their collection and compilation; and 3, the neglect or omission of numerous particulars, which could be ascertained only by means of a national system of inquiry.

Our *social* statistics, for analogous reasons, are strikingly defective. Here the information obtained is still more dependent upon the particular views of local observers and reporters, and is therefore less reliable.

The collection of *agricultural* statistics also remains an unsolved problem; and will, probably, never be properly or satisfactorily performed, unless under scientific direction, connected with other objects of public utility, and divested of its merely fiscal aspect.

Thus, in the first place, a thorough physiological knowledge of the fauna and flora of any district would be an essential qualification for a Superintending Local Reporter, who ought to be competent to inquire into the occurrence of unusual or morbid conditions of any tribes or species of the vegetable kingdom; to note occasional developments in air and water, of peculiar forms of insect or animalcular life; to investigate the nature of these phenomena, their connexions, and their influence upon vital or functional changes in the higher order of animals, and in man himself. The same officer would naturally be the chief registrar and compiler of *meteorological* and cosmical phenomena—a field of inquiry which is vastly increasing in extent and interest as regards the practical concerns of life, yet (if we except what is so well done at the Royal Observatory, and by the Meteorological Department of the Board of Trade) cultivated only in localities favoured by the casual residence of philosophical amateurs.

Some such local officer should also be competent to direct *geological* researches, with reference to social objects; as agriculture, drainage, water supply, building, &c.

Again, in the application of *chemistry* to local purposes, whether educational or practical, great necessity exists for highly scientific agents in official position. To determine the composition and qualities of different soils and waters in changing seasons and circumstances; to analyse manures and crops; to indicate the comparative advantages, test the purity, and detect the falsifications of articles sold or used for food and beverage; to ascertain the

genuineness of medicines, and to reveal the presence of any poisonous or deleterious agents which may exist in manufactured articles or organic structures; all these are indispensable duties for a highly qualified *public analyst and histologist*, who should be responsible, not so much to the inhabitants of the locality—*i.e.*, to its producers, manufacturers, and retail dealers—as to the nation in its collective capacity.

Here, then, the Government may fairly step in to the aid of science on grounds of *public safety*. It would be easy to show how such an officer would be the most available and competent referee in those forensic inquiries which affect human life, health, and liberty, and which, as they are now prosecuted in this country, serve little more than to bring physical science into contempt, and its adepts into disrepute.

An independent public officer, of high scientific attainments, could alone be relied upon for accurate and trustworthy reports on the effects of various industrial occupations and commercial processes which are suspected to be injurious to the community, or to persons employed in them, especially in crowded populations. The same officer would naturally be the scientific adviser and assessor of local executive boards;[c] as the *Kreis-physicus* (a physicist rather than a physician) of the German States is to their provincial and district magistrates. An officer of this kind might also act as instructor of the people in matters which connect science with daily life and labour. The public chemical laboratory, with philosophical apparatus and mechanical or industrial models—for there should be such an institute in every district—should be open, under his superintendence, not only for the gratuitous instruction of the people, but for their personal protection, by affording them, also gratuitously, the means of detecting adulteration or decay in articles of daily use and consumption.

The regular statistical reports—which, as I have suggested, might be compiled by some such scientific officer—exhibiting the fluctuations of vital force in man, animals, and plants, under varying physical or climatic conditions, and in connexion with local customs, habits, and arrangements, should be printed and circulated for municipal and popular information in every district. All this could be done without fear, favour, or prejudice, *only* in so far as the required scientific agents be made independent of disturbing local influences. They should be "emancipated from all such interference as is calculated to obstruct the zealous performance of their duties."[d]

The size and extent of the district in which such a professor or officer might act with advantage to the public, is a correlative question, which I have already discussed both in my *Essays on State*

[c] "As assessors or advisers to executive boards, the services of scientific men would be highly valuable." (Glasgow Report of British Association, Parliamentary Committee, p. lvi., 1855.)

[d] *Ibid.*, p. lxii.

Medicine, and in my paper *On the Territorial Distribution of the Population*.

I do not say that in every district, of the extent there suggested, one such scientific person would suffice as the *sole* authority; that is, as teacher, referee, inquirer, and reporter. On the contrary, I think it probable that the functions of the professor might be often advantageously separated from those of the investigator; and therefore that, in some places, *two* specially qualified persons might be very judiciously appointed. It is also probable that certain technical inquiries might sometimes require a further, though perhaps temporary, division of labour. The civil engineer and the analytical chemist are of equal importance in public undertakings.

Moreover, a sufficient knowledge of physiology, as regards living forms generally,—of pathology, in the same wide signification,—of chemistry, theoretical and practical,—of geology,—of meteorology,—and of statistical processes and results,—might not always co-exist in the same officer. But a general acquaintance with the natural sciences, official aptitude, power to call in technical aid, or to refer any disputed point to a metropolitan board, and liberty to accept the local co-operation of philanthropic persons more profoundly versed in specialities, are conditions which would render *one* scientific appointment (beside that of a local professor) more beneficial to the public than the creation, in the same place, of several scientific posts, which, from the very circumstance of their number, would of necessity be inadequately endowed.

The scientific offices should be "placed on a level, in respect to salary, with such other civil appointments as are an object of ambition to highly educated men." (See *Glasgow Report, loc. cit.*). By a national provision of this kind, inducements would be held out to students to acquire a knowledge of scientific truths; "and, after the period of pupilage has expired, to extend it, and turn it to useful account;" while "the whole body of competent men of science" would exert "a due influence over the determination of practical questions, dependent for their correct solution on an accurate knowledge of scientific principles." (*Ibid.*, p. xlviii.)

With regard to the power of appointment, we may be sure that extremely few local executive boards, as at present constituted, would be likely to select scientific agents of the highest qualifications; nor could such a right be fairly claimed by district authorities, if the cost were borne by the nation. No existing board would be more capable of determining these appointments than the "Board of Science," suggested in the *Glasgow Report*; although the recommendations of those local residents who are competent to form an opinion would of course have their due weight.

It is difficult to conceive a limit to the benefits which science, thus established and supported, might confer on the people. It would be difficult, I think, to point out any direction in which the

state, by legislative sanction, could more materially aid the cultivation of science, than by connecting it with the improved administration of what we call "local self-government," and by enlisting it in the cause of a correct compilation of national and local statistics.

CHELTENHAM, *September*, 1856.

(C.)—ON THE TERRITORIAL DISTRIBUTION OF THE POPULATION, FOR PURPOSES OF SANITARY INQUIRY AND SOCIAL ECONOMY.

Read before the British Association for the Advancement of Science, Cheltenham, Aug. 12, 1856. *Section F.*

(*Revised from Journal of Public Health, Oct.* 1856.)

In the present condition of society, but few and rare opportunities are afforded to States to group their populations on scientific principles, to determine the most salutary and beneficial sites for human habitation, or to combine the sites so occupied in well-contrived districts for the purposes of statistical inquiry and local management. No reasonable excuse, however, can be made for omitting to provide for a judicious allocation and distribution of a *new* population, as in the case of colonies, and of settlements on unoccupied tracts of land. To neglect this public duty must be to inflict irreparable injury not only upon the first occupants, but even more seriously upon their descendants, as has been unhappily proved by numerous instances of unskilful migration and colonization in the history of our own race.

Enough is already known of the influence of climate and soil, and other natural features of locality, upon man's physical and psychical condition to prevent any gross mistakes being made in future, either by governments or by the promoters of voluntary and associated enterprise.

We are now in a position to show that no occupation of places, notoriously and obviously unhealthy, for mere commercial purposes, is justifiable, or likely to be ultimately beneficial to a community. How great the peril and loss which have resulted from peopling such spots as the deltas and *embouchures* of large rivers; the banks of sluggish streams; alluvial soil periodically deposited by floods upon lands where drainage is most difficult, if not impossible; closely pent-up valleys among mountain ranges and in clefts of table-land, tempting the ignorant and unsuspicious by their beauty and verdure, and apparent security! Surely the consequent destruction of life (in some cases enormous), the deterioration and degradation of the inhabitants, not only in their physical structure, but in their mental and moral being,—and the immense sacrifice of national and personal wealth which is afterwards demanded to palliate the frightful evils which man has thus inflicted upon himself,—are considerations of sufficient importance to decide the national course for the future with regard to colonization or migration.

2. But, in England, we have to deal with an *old* population, rapidly advancing in civilisation, having its established laws, its complicated divisions, its carefully-protected rights of property, and, moreover, extremely jealous of changes, even when proved to be conducive to the public welfare. Hence the difficulties which attend any re-opening of the question.

But these difficulties are not greater than many which the persevering Anglo-Saxon race, with its Scandinavian and Norman elements of force and energy, has often overcome.

I would rapidly glance at some of the causes of population movement which have occurred since the settlement of our island by its present composite race. In the middle ages, locomotion was common enough. If later facilities of transit were wanting, later obstacles to it had not then arisen. A hardy and daring people, of simple habits and few possessions, living in a country only partially enclosed, had little to check their migratory tendencies, except the will of chiefs and conquerors, where that could be enforced. Clans, serfs, and villeins were bound far more to their lords than to the land, and moved at command. Continuous practice in civil and foreign war enabled armed bodies to shift rapidly and easily from place to place, while settlements for industrial purposes were as repeatedly changed, to escape feudal oppression, military exaction, or religious persecution. Even the lonely and helpless travelled in those times more securely, if not comfortably, than some are disposed to think. The age had its decencies as well as its asperities, and special means of protection existed. Inns, or rather hospitals (*hospitia*, whence our old "hospitality") abounded, and ecclesiastical refuges were thickly scattered throughout the land.

But after the fifteenth century, the gradual consolidation of the parochial system of England checked irregular migration and regular vagrancy; and it is needless to describe, for we all know, the effect of that system in *fixing* each man, woman, and child to a certain spot. The great social reform effected in the reign of Elizabeth led to the Settlement Laws, and the people became, in a peculiar sense, *adscripti glebæ*. Hence, as roads did not improve, and as property with its attendant comforts and conveniences increased, the parishioner became less inclined to move, and more apprehensive of the perils of travel, while the man of substance made his will before a journey of fifty miles.

Now, however, the social immobility of the seventeenth and eighteenth centuries has again relaxed, and is fast passing away. The settlement laws have been greatly modified. We are again becoming, in some sort, a nomadic people. Business, speculation, colonization, science, health, pleasure, and the mere love of change (a kind of vagrancy) shift us from place to place, unsettle our local associations, and loosen our local bonds. The very character of our habitations is changing; the massive stones and timber which formed the wall of one house, three centuries ago, would now suffice, under structural improvements and economy of material, for half-a-dozen houses. Iron and wooden buildings, of all sorts, sizes, and

shapes, fitted for all purposes, domestic and public, are now made and sold in great numbers, ready to be packed and transported, commodiously and cheaply, to any distance, by railway or ship. No Mongolian wanderers of Central Asia ever struck, carried, and pitched their rude tents with such facility as we now do our skilfully constructed portable houses. The legal transfer of property is also becoming far less costly, and therefore more common. Another barrier to change of residence is thus removed.

3. But the most important movement of the population in modern times has reference to its local aggregations. To go back no further than the beginning of the present century; the inhabitants of cities and towns in England did not then number one-third of the total population; but during the half century ending in 1851, they had increased so rapidly as to equal the population of the rural districts.

In connexion with this greater compression and condensation of the population in certain localities, many and serious evils—physical, social, and moral evils—which I need not here specify, have accrued; but the results are beginning to be so much more clearly felt and understood by the people themselves, that a movement of a corrective and compensating kind has lately arisen. The crammed interiors of towns are beginning to disgorge the human masses which they have swallowed (it may be said) too quickly for a safe social assimilation. New openings and lines of street, through the centres of closely built cities, are gradually dispersing their banefully crowded inhabitants. Narrow lanes of tall houses, confined courts and alleys, dark basements and cellar dwellings, reeking with all physical and moral impurity, are now being slowly emptied of their injured occupants; while dwelling houses of a better sort in the heart of old towns are being fast converted into warehouses and workshops, so that a steadily diminishing proportion of the people sleeps within ancient municipal limits. The working classes, thus displaced, are finding accommodation in the outskirts, and spreading over the surrounding districts. Thus the benefits of an almost rural residence are no longer exclusively enjoyed by the man of office, the banker, the lawyer, and the merchant; for the small tradesman and the clerk have followed the wholesome example, and the centrifugal impulse now extends even to the artizan and the porter.

Suburban inhabited areas are accordingly increasing much faster than urban populations, while the universal railway enables a far larger proportion of the working classes to live conveniently and economically, beyond the reach of town smoke, to see the sun rise, and to breathe the fresh air of green fields.

4. This movement, be it observed, is advancing in the teeth of laws and institutions, which are now worse than useless. No one would pretend that the original object of municipal organization any longer influences our population. We need no protection against monarchical or feudal tyranny. Yet the tendency of all past legislation, even to this day, has been to impose narrow territorial limits upon town communities, and to tempt the people into injurious aggregation.[4] This policy needs to be reversed. The abolition of such absurd and mischievous restrictions, and the extension of political rights and municipal privileges to the entire population of the kingdom, would materially aid in restoring that salutary balance of town and country population which has been temporarily disturbed by the rapid advance of commerce and manufacture, unaccompanied by provisions for a beneficial allocation of the people.

But whatever may be done or left undone as to parliamentary representation, it is clear that the gradual outpouring of town populations will remove many current objections to an amended division of the country for statistical and sanitary purposes; and we shall, therefore, do well to look closely and carefully into the anomalies and perplexities which attend upon the various existing systems of territorial distribution.

5. Our old parochial divisions are not uncommonly found to be wholly irreconcileable with the altered grouping of the people. If the venerable parish church, with its sacred and ancestral associations, still attracts, and, to a certain extent, localises the population in many rural districts,—the colossal mill, the palace of manufacture, the coal field, the mine, and the harbour, determine more rapidly and imperatively the aggregations of a commercial and industrial community,—and, I must add, too often with utter and appalling neglect of the physical and moral prospects of the population thus brought together.

These new hamlets and townships are almost necessarily formed without reference to parochial boundaries, which, if not revised and corrected to meet the changes of population, become practical nuisances. Hence, in populous districts, legal powers are occasionally conferred upon municipal or ecclesiastical authorities to alter and amend parochial limits. As new sites are peopled, new divisions and boundaries must be settled. But, I would ask, are these alterations made upon any definite and well-considered principles? Does science aid them? does enlightened experience direct them?

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[4] Political privileges, to say nothing of the substantial advantages which it is found so difficult to separate from the parliamentary suffrage, have been exclusively bestowed upon the freemen and occupiers of boroughs; and the working man, in too many instances, has not feared to encounter the higher rent of a house within the limits consecrated by parliament, because he knows that, when his vote is wanted, his landlord will be paid. Why should not tenants in rural districts share in the borough representation? Is not the ten-pound house in the country (I do not say, its occupant) superior in every respect to the ten-pound house in the city? Why not then confer upon every householder throughout the land the right of voting in that borough with which he might be most conveniently connected? Why not thus enlarge the areas of parliamentary boroughs until their boundaries meet, and finally settle the question of future extension? Why not leave the election of Knights of Shires to the ancient freeholders and owners of property? Why not thus avert the unsafe and unconstitutional project of assimilating the county with the borough suffrage? And why not, by these reforms in the representation, promote that most desirable reflux of the population, for which the sanitary reformer calls?

Beside the parochial divisions of the country, there are others as ancient, yet still more in conflict with the changing localisation of the people. Tithings and hundreds have generally become little more than matters of history. Boroughs and cities very rarely include an exact number of parishes, or coincide precisely with parochial limits; parts of the same parish are commonly to be found on either side of the same municipal boundary, and even in different counties.[e]

6. But the comparatively recent division of the country into *Poor-Law Unions* was based more accurately upon the parochial system, and unions are generally exact aggregates of a number of parishes. The same union, however, often includes parishes or parts of parishes in two or three counties; and, generally speaking, no kind of relation exists between the boundaries of boroughs and those of parochial unions. The latter were also formed without special regard to the natural features of the district. Great facts of physical geography were ignored. The able and learned gentlemen who were officially employed to describe, define, and form the unions, did not profess to be guided by scientific considerations, or to be influenced by established principles of hygiène. Science, commonly so called, had, therefore, no effect upon their decisions. It would even appear that facility of communication between different parts of the same union or district must have been purposely set aside in many instances. It was probably, in such cases, rather an object to place some highly pauperised group of population at a distance from the sources of relief on which it had learnt so injuriously to rely. The hilly ridge, the pathless morass, the bridgeless river, were therefore seldom considered as necessarily marking the limits to a union or district.

Without enumerating other divisions, ancient and modern, some for the administration of justice, others for taxation, others for ecclesiastical polity, I have already noticed enough of conflict and diversity among all these systems of partition to convince any one of the great difficulties under which both official recorders and students of vital statistics must labour.[f]

7. The registration system of this country, with which is now combined the machinery for the census, is based upon the Poor-Law

[e] The late Mr. Rickman noticed, that "there are in England and Wales about 550 parishes which are known to extend into two counties, or into more more than one hundred, or other division." (Census of Great Britain, 1851, 8vo, p. 24.)

[f] "The inconvenience and perplexities which the variety of ecclesiastical, military and civil, fiscal and judicial, ancient and modern, municipal and parliamentary, subdivisions of the country occasion, have been sensibly felt by us, as they were brought under our notice in the enumeration of the population. It is not within our province to reduce all these to simplicity and harmony; but we call attention to their existence, and venture humbly to suggest that the task of taking any future census, the comparison of statistical facts of every kind, and probably all administrative arrangements, would be greatly facilitated by the adoption of an uniform system of territorial divisions in Great Britain." (Census of Great Britain in 1851, 8vo, p. 25.)

division into unions.[g] And the returns of the population, births, deaths, and marriages, in union districts, have made the defects of the Poor-Law division more obvious; while an erroneous distribution of the people has, in turn, affected the compilation of vital and sanitary statistics. Moreover, no information upon such matters is officially published in each locality.[h] So that it has been found extremely difficult to ascertain the bearing of any natural or artificial features of a particular tract of country, or any social characteristics of a populous district, upon the life, health, and welfare of its inhabitants.

To give an instance. The other day I was questioned by one of the Vice-Presidents of this Section concerning the physical and sanitary condition of the population of the Forest of Dean, in this county; a district of peculiar geological formation, bounded by important rivers, and inhabited by a very distinct class (I had almost said race) of people. But the fact came out, that the registration and census divisions give no collective information on the subject; for not only do those unions, which contain most of the Forest parishes, embrace other portions of population in widely different circumstances, but no fewer than twelve of the Forest parishes, containing a total population of more than 20,000, are contained in unions nominally belonging to the adjacent counties—Herefordshire and Monmouthshire. Nor does it appear that those Forest parishes, which are included in the adjacent "registration" counties, constitute separate districts, so as to admit of being again grouped with the Forest subdivisions, for statistical returns. To determine correctly the physical and social condition of this remarkable population would, therefore, require a completely new arrangement of the parochial groups, and a new compilation of ultimate facts.

I might give other instances within my own limited sphere of observation, especially in unions containing both town and country populations—the several districts of which have not been determined with reference either to the condition of the inhabitants, or the natural features of the inhabited surface—and from which, therefore, *no trustworthy statistical deductions can be drawn*. For this, among other valid reasons, it is unsafe to adopt the rate of mortality in any union (registration district) as a test of the actual salubrity either of its principal town or of its more scattered population. The apparent rate of mortality in large towns is swelled by deaths, in hospitals and workhouses, of people who lived in distant country parishes. Either the mortality of all such institutions should be returned separately from that of the districts in which they are contained, or the deaths should be carried to the account of the several parishes from whence the patients come. Frequent periodical returns of the vital force of

[g] The registration districts are 620, and the subdistricts 2190 in number, each district containing, on the average, seven parishes, townships, or places, and some populous parishes being divided for the purpose.

[h] Except in places where officers of health have been appointed, and there only partially.

the population (*i. e.*, the ages of the living) in each district, according to class or occupation, are also essential to correct such conclusions as are drawn solely from its ratio of deaths. I must, therefore, repeat, that until our vital statistics are more complete, and compiled from a more scientific classification of the people, we can arrive at no positive conclusions respecting the life, the health, the social state, the education, the morals, and the habits of those who inhabit the several places; we are unable to demonstrate with certainty the causes of social evils; and, therefore, we hesitate to call upon the legislature to inaugurate those social reforms which, in this country, can be carried into effect only by the cordial co-operation of the enlightened and influential portion of the community.

9. Another obstacle to a scientific division of the country arises from the co-existence of several sorts of local *administrative bodies*, exercising conflicting functions, and with different areas of jurisdiction.

On the one hand, we have boards of guardians, elected by ratepayers and owners of property, and aided by the magistrates of the county, as *ex officio* guardians. These boards, as was well shown before the Committee on Sir B. Hall's Bills in 1855, superintend the interests of the entire population, and have already so many sanitary functions to perform, that they cannot, and (we may rely upon it) will not, be set aside by any general measure of public health which would leave them out of the question.

On the other hand, we have, in most towns, either local boards of health, or bodies of town commissioners, or town councils, elected by owners and ratepayers only, and therefore on no better system than that adopted for the election of boards of guardians. And to these bodies another class of sanitary functions is committed, though not exceeding in importance those exercised by boards of guardians. There are, therefore, two kinds of functions, imperfectly defined, and exercised in most places by at least *two* elective bodies, with different areas of jurisdiction—the medical and vital statistics being collected by that body which has been the most distrusted as regards the sanitary management of the district.

10. Before proceeding to practical suggestions, I would briefly call attention to some of the anomalies and inconveniences which have resulted from limiting the execution of sanitary powers to bodies representing only dense and circumscribed portions of the population.

Among the practical evils of limited jurisdiction, I may notice, (1) the difficulty of obtaining an adequate and unexceptionable water supply; (2) the difficulty of providing outlets for common sewers, and a market for the products of sewerage; (3) the difficulty of protecting streams and rivers from defilement and impediment; (4) the difficulty of securing suburban places of sufficient extent for public recreation, for the erection of sanative institutions, and for the burial of the dead.

Again, the population surrounding these confined jurisdictions is excluded from even that small amount of benefit which may be derived from existing local sanitary administration. In a report on the mortality of Gloucester, which I presented to the Registrar-General in 1848, I showed, by a comparison of the deaths, the ages at death, and some apparent causes of disease, in the city proper and in the suburbs, that the latter were by far the more unhealthy and the more urgently in need of vigorous measures of sanitary reform. Mr. Crosy, the superintending inspector sent by the General Board of Health, confirmed the correctness of my distinction, and accordingly recommended that a considerable district of country, extending in some directions two miles from the centre of the city, should be included within the jurisdiction of the local board. But political questions arose; the town council claimed exclusive powers, and the provisional order was ultimately applied only to the parliamentary borough. The result was thus described, four years afterwards, by a resident gentleman of great intelligence, and belonging to no profession:—

"The jurisdiction of the Local Board, I am sorry to say, does not extend beyond the boundaries fixed by the Municipal Act, which practically excludes one-third [more now] of the population from any control. Upon this serious obstruction to sanitary improvement, my attention has long been fixed. I counted seven hundred houses on one side of the city, whose only drainage is Sudbrook, all beyond control; and, owing to the direction of the prevailing winds, the town has the full benefit of all the effluvia which their refuse creates."

The suburban residents looked in vain to the managing authority of the outlying districts for redress; for, said he, "The board of guardians does not co-operate with either the Local or General Board, but, I believe, offers all the obstruction in its power."[1]

Now this I believe to be a very common case.

11. Suburban populations, for reasons already stated, consist more and more of persons belonging to the humbler classes of society. Now, unless efficient building laws, founded on established sanitary principles, be enacted and enforced to protect the working classes against the injurious speculations of unscrupulous capitalists; unless, moreover, a sounder system of education than the present be extended to the whole working population—I mean a moral, industrial and physiological education, which may enable men and women to comprehend their true relations to the external world, and their duties to society and to their families;—unless they are thus trained in thrifty habits, and induced to devote some portion of their wages (now often worse than wasted at the beer-house, the gin-shop, and the casino) to the payment of a somewhat higher rent for well-located, well-drained, and well-ventilated dwellings; unless, I say, these social changes be effected, we must expect to see, among suburban and village populations, an aggravation of those sanitary and social evils which were formerly more conspicuous in towns.

[1] Essays on State Medicine, pp. 333–4.

12. Again, "The error of commencing sanitary legislation, by circumscribing sanitary jurisdictions, has led to the adoption of a canon of administration, wholly unreasonable and indefensible, namely, that all districts in which it cannot be proved that an excessive number of persons die annually shall be exempted from the operation of a general sanitary law.

"Observe the difficulties into which the movement party has brought itself by this concession. The first question of the objectors is—What do you mean by excess of mortality? All above *twenty-three* in a thousand of the population—the average of English mortality, according to the Public Health Act. All above *seventeen* in the thousand—the "natural rate" of mortality—pleaded our first vital statist. All above *twenty-seven* in a thousand, replied the ingenious and indefatigable advocate of the parish-vestry party. All above *twenty-five* in a thousand, concluded Parliament, because that number splits the difference between Sir Benjamin Hall and Mr. Toulmin Smith.

"The excess of mortality being thus summarily, if not satisfactorily, settled,—the fatal effects of the want of a preventive law having been correctly calculated—the required number of lives having been prematurely sacrificed to the regulated neglect—the preventive law may then, and not till then, be enforced. One is irresistibly reminded of the stolen steed and the order to fasten the stable door. All this, be it observed, is based on the assumption that a certain annual ratio of deaths, in any spot, is *the* test of its insalubrity. To argue further on such a point would seem to be a mere waste of time. Yet I must be allowed, by way of illustration, to ask—What would have been thought of a proposition to restrict the application of the new Poor-Law to parishes in which the rates exceeded so many shillings in the pound? Or, of a Bill to abolish the constabulary force in every county or district in which less than an average number of crimes were committed annually?[j]

The several objections which I have now urged against existing divisions and isolations of the inhabited surface of this country, I beg to recommend earnestly to the consideration of this Section; and I submit that the difficulties in the way of a revision of the census and registration division of the country, for sanitary purposes, are of no great magnitude, and certainly not insuperable.

13. My first practical deduction would be, that no system of territorial distribution of population deserves to be either defended or adopted which does not secure for every portion of the country, whether town or rural parish, the superintendence of a uniform administrative machinery, competent to collect and verify *all returns relating to the numbers, the vital force, the mortality, the disease, and the reproduction of the population*, as well as to carry into effect all sanitary precautions. Now, in order to provide this general benefit, the boundaries of the registration districts ought to be revised with

[j] Essays on State Medicine, pp. 334-5.

reference to physical topography, and the subdistricts, especially, should be so contrived, that, if possible, each may contain a population under similar physical circumstances,[k] while its shape and extent should be such as to admit of easy and convenient intercommunication among its inhabitants.

14. By statistics of disease, I mean returns of all sickness and accidents attended by the medical officers of districts; all such ailments as are medically relieved in those noble hospitals and charitable dispensaries, which succour more than half of the labouring classes of England; all sickness occurring among bodies of workmen in public employ, or in legally established clubs and provident societies. Such a registration should have special regard to the causation of disease, and to its relation with residence and occupation. And this invaluable mass of information, now lost for want of collection, should be registered by the same machinery as that employed for registering the births and deaths of the people.

Meteorological observations, and the varying physical conditions of the animal and vegetable kingdoms—all those higher phenomena which are lost sight of in a mere numerical record of agricultural produce—should be concurrently recorded in each superior registration district. And these combined observations and records should be published periodically in each locality for the instruction of its inhabitants; for, as these become better informed on the various circumstances which affect their physical well-being, prejudices will subside, habits and manners will improve, opposition to improvements will diminish, and local councils will become more useful and effective.

15. A second deduction from my preceding argument is, that the law should no longer confer imperfectly defined powers of a sanitary or reformatory nature upon two or more rival boards in the same place, yet with different and irreconcileable areas of jurisdiction. Now, as neither boards of guardians, nor town councils and other similar bodies, would be likely to consent to a general surrender of their sanitary functions to their rivals, I infer that *new* representative bodies ought to be instituted for the local administration of all matters affecting the public health and the physical condition of the people in every part of the kingdom, with larger jurisdictions than now belong to any of the corporate authorities which the legislature has partially and unsystematically empowered, and to be constituted, in great measure, of delegates from those established bodies. If each of the local boards and councils were fairly represented in a new superior court, as the district boards of London are in its metropolitan board, all reasonable objections to the proposed change might be removed.

I have elsewhere shown[l] how the philanthropic and scientific elements of control might be introduced into a higher kind of local

[k] Where any subdistrict necessarily includes persons living in very different localities, the vital statistics of those places should be separately returned.

[l] Essays on State Medicine, pp. 344-5.

administrative body; and, I would only add, that if these matters were directed in every district by better constituted local councils, there would be less excuse for advocating any scheme of a centralizing tendency, so repugnant to English notions.

16. Thirdly, as to the extent and form of the proposed jurisdictions. Instead of 587 provincial registration districts (I exclude those of the metropolis, both because that is now the subject of a new and somewhat doubtful experiment, and because London must always be dealt with separately and exceptionally), I recommend less than half that number. In other words, each superior district for the collection and registration of vital and sanitary statistics might contain, *on the average*, two or more parochial unions. Existing boundaries should, of course, be followed, unless some obvious advantage were to be gained by altering them; but wherever a correction of boundary might seem to be demanded, the physical geography of the locality should be carefully borne in mind, and, if possible, each parish or cluster of population should be included in that district, the principal town of which would be most easy of access. Special regard should be had to density of population. Where the *specific population* (as the French statists call it) might be under 200 persons upon an English square mile (three acres and one-fifth to each person), a total population of 40,000 or 50,000 might suffice for the sanitary jurisdiction. Where it might exceed (say) 400 upon a square mile (giving less than one acre and three-fifths to each person), a population of 70,000 would not be too many; while a higher amount of population might be included in the case of a first-class town.

Further, every sanitary jurisdiction should be an exact aggregate of a sufficient number of small districts for medical visitation, which should be either identical with the registration subdistricts, or subdivisions of them. The boundaries of the existing union medical districts might be gradually and cautiously revised for the purpose.

17. Fourthly. Another object of great practical importance would be attained by the creation of the proposed larger sanitary jurisdictions. Every facility would then be afforded for the appointment of a superior class of officers of health. The superintendence of the registration of births and deaths; the collection of other statistics affecting life, health, and disease; the scientific observation and record of various natural phenomena; examinations and evidence in aid of forensic inquiries; the supervision of various preventive duties, as vaccination, measures against and during epidemics, etc.; the inspection of articles of food and medicine; all these and other duties, properly performed, would occupy the entire time of a skilled and experienced superintending officer,[m] who ought most certainly to be debarred from private professional engagements, and thus be rendered independent of those local influences which are known to be adverse to an unflinching and

[m] It might be desirable to divide these functions among two or three officers, with different titles and qualifications.—(Essays on State Medicine, pp. 50-1.)

uncompromising discharge of public duty. Such an office would be analogous to the *Kreis-physicus* of the German States, whose scientific reports and preventive duties are of great value, and would doubtless lead to more important practical results, if laid before an English community with its practical tendencies and its ample pecuniary resources.

18. The questions involved in the territorial distribution of the population are of the largest importance to society; but I must now close these remarks by a brief recapitulation.

I. The physical geography of the district, and the general character of its population, should be the main facts upon which any revision of the areas of sanitary inquiry and jurisdiction should be founded.

II. Areas for statistical returns should be co-extensive with those for sanitary management.

III. The extent of these areas should be large enough to provide satisfactorily for the amalgamation of existing smaller jurisdictions.

IV. The superior sanitary districts should also be large enough to secure, with economy, the appointment of a higher and more useful class of sanitary officers.

All these changes might be judiciously carried into effect, I believe, without any reckless or offensive sacrifice of existing interests, or any violation of justly established rights.

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of these semi-charitable institutions—are in a great measure unconnected with benefit clubs, and have to rely on the benevolence of the private practitioner, or on the public charities. If the constitution of society be such that the labouring classes are unable out of their own resources to provide for the ills to which flesh is heir, why should the medical profession be called upon to bear so large a part of a burden which is common to all. Are medical men, as

excellent sanatary regulations was the total absence of all epidemics whatsoever. Typhus, which had devoured our army at Mayence at the end of the campaign of 1813, and soon became our principal scourge in the Crimea, was not at all seen in the hospitals of the North, nor was hospital gangrene.

The preceding facts having been published, a serious duty is imposed on all governments having troops to make use of like sanatary arrangements, in order to obtain the like happy results. . . . But, above all things, our soldiers should be *well nourished, well clothed, and should be furnished with india-rubber sheets*, the same as those supplied to the American troops, to protect them from the moisture of the soil; woollen blankets to maintain vital heat, and so in a great measure avoid the vicissitudes of camp life. There should also be a sufficient number of surgeons, and a larger number of well-instructed hospital assistants than in the Italian campaign of 1859.* They should be well supplied with medicines, and with the means of transporting the sick and wounded, and be amply furnished with the best and most perfect surgical instruments. The strict observance of the laws of hygiene in the organisation of encampments, ambulances, and hospitals, should be rigidly enforced. All this has nothing to do with politics or strategy. These are rules which cannot be refuted, and are as well known in Berlin as in Paris (in Victoria ?—TRANSLATOR). We shall be committing a great fault, if we do not make use of them for ourselves.

Having referred to some charitable subscriptions, M. Chevalier continues: It is not the sum of money which can represent the ingenious efforts, the inventions, the vigilance employed, and, above all, the personal superintendence of those engaged in the work in America—they had the best arranged ambulances, the best railway waggons, and the best steamboat accommodation for the transport of the wounded.

Further, after eulogising the American sanatary commission, M. Chevalier ends his valuable paper. There is so much instruction to be derived from it, and in many instances so applicable to our position in Victoria, that I felt an irresistible impulse to translate it into English. The abridgment consists in leaving out anything that did not immediately relate to sanatary matters. The rest I have endeavoured to translate as nearly verbatim as the construction of the language would allow. I am afraid, in places, it is too verbatim to be considered English.

J. H. H. LEWELLIN, M.R.C.S.,
Surgeon, Southern Rifles.

Chapel-street, Prahran, Dec., 1870.

P.S.—The word *typhus*, when used in a general way, in French, includes *typhoid*.

* In the present war (1870) the Germans have upwards of 10,000 men in the Ambulance Corps, who are all instructed in bandaging, applying tourniquets, &c.—TRANSLATOR.

Review.

Digest of the Return ordered by the Legislative Council of all the Deaths (2143) *from Phthisis, in Melbourne and Suburbs, during the years* 1865—1869, *and the first half of* 1870; *forming a Sequel to the Essay on Phthisis, &c., &c.* By WILLIAM THOMSON, L.R.C.S. Edin. Melbourne: Stillwell and Knight, 78 Collins-street east. 1871.

FOR reasons formerly stated by us in our review of Dr. Thomson's book on "Phthisis," the facts it set forth were startling to the general public. To the critics—literary and scientific—they were not less so. The statistics exhibited were invulnerable, and the conclusions to which they led were powerfully and eloquently reasoned out. However any may differ from the theory and deductions, all must admit the candour of the author, the humane purpose for which he wrote, and the scientific and logical manner in which he acquitted himself. The *brochure* before us is a sequel, based on extended data, procured from a source which neither personal foes nor antagonistic theorists can by any possibility call in question. In securing a parliamentary return "of all the deaths from phthisis in Melbourne and the suburbs" during a period of five years, Dr. Thomson has set all *personality* in dealing with the *principles* contained in his book at defiance, and hazarded the scientific truths of his deliverances on the severest of all tests—statistics. The author who spontaneously hinges the finality of a question on such grounds, is surely not only entitled to a respectful hearing, but that his data and statements shall be considered "on

their merits." So carefully, in his first book and the Sequel, has he gathered and classified his facts, and so logically has he analysed them, that, unlike the indecision of some of the writers who have affected to criticise his literary labours, he speaks "as one having authority." Yet his authoritativeness is in no sense marred by dogmatism. His data are the echoes of the voice of figures that cannot lie; and when his data fail to warrant final conclusions, he is content either to theorise or suggest. Such is ever the method of a true philosophy.

Writing critically, we do so impartially, so that whilst agreeing with the principles enunciated by our author, and accepting his statistics as witnesses sworn to speak the truth, we must protest against our being regarded as partisans. If we do not find fault either with the spirit or the workmanship of the author, it is because candour is more congenial to us than scurrility, and because we find so much in "Phthisis" and the "Sequel," whether viewed as scientific or literary works, to admire and approve. The reviewer who indulges a taste for *mere* fault-finding—as if there can be no critical acumen without *that* speciality—is morally disqualified for the high position he assumes. Such writers can give no uneasiness to a mind like Dr. Thomson's, except in so far as they may help to retard the progress of truth. His works—books of facts as they might be called—look calmly on mere quibble-criticism; on their merits, they need not the fictitious aid of any partisanship.

In our present strictures, we shall refer not only to the "Sequel" but also to what has been said in certain quarters about the work on "Phthisis," because it will not only afford the best method of expressing somewhat our own views on the subject of Consumption in Australia, but also help to clear away a few fallacies that have been propagated in criticising, as well as protect our author against aspersions that have been flung at him in mere critical wantonness.

The principle on which the works under consideration are based is aptly set forth in a quotation from Dr. Alison (*Sequel*, p. 2):—"It is, however, generally agreed among medical men, that to questions regarding the external causes of disease and the means of their prevention, statistical evidence, or the numerical method of inquiry, is chiefly applicable; and in a little consideration of such questions, the reason of this is usually sufficiently obvious." That is indeed the process, in working out a theory, on which all men of science proceed. Hence the existence and value of such a periodical as the "Statistical Journal." The Social Science Society, of very modern days, rests entirely for all its deductions and schemes on statistics. The science of Meteorology is based entirely on statistics, and they, as the summation of authenticated experiences, spread over large surfaces and during prolonged periods—in the hands of able analytic and observing minds, such as Maury, Col. Reed, Admiral Fitzroy, and others—have indicated the laws of storms, tide currents, prevailing winds, &c., &c., and brought about a marvellous success in bridging over the distances between remote sea-ports. So truly have *statistics* spoken in their hands, that the old saw "uncertain as the wind," has, in this sense, ceased to have any scientific significance. By the light of statistics, its certain direction and destination can be predicted with wondrous accuracy. Yet, when the very principle demanded in every department of science, without which there could be neither progress in civilisation nor increase of knowledge as a power, is applied by a close observer and an earnest thinker to Phthisis in Australia, it is opposed as fallacious, and answered by a reference to a so-called "common-sense" and "experience." One writer says, "the writer, in a comparatively limited acquaintance, knows twenty at the present time in tolerable health, who, had they remained at home, would in all probability have been dead."—(*Victorian Independent, December*, 1870). In a recent work, called "Homes and Homesteads," chap. 29 is devoted to the "Influence of Victorian climate on consumptive patients," and contains the following statements:—"One writes eloquently on the advantages of a voyage to Australia to one suffering through pulmonary affection; another writes equally eloquently on the other side. Who is right? Who sh[illegible] decide when doctors disagree? Perhaps it may not be the worst plan to give the answer which common-sense, prudence, and experience, may supply. We shall try, at least, to do so. The following things may probably be asserted with safety:—1st. A dry, pure, mild, warm climate is understood to be beneficial to consumptive patients. This is the character of the climate of Victoria. 4th. To send consumptive patients to Australia in the early

and incipient stages of the disease may in all likelihood be the means of arresting its progress, and, humanly speaking, saving the subject of it from a premature grave. We have known numerous instances of this. Generally speaking, their language has been, 'If I had remained at home, I believe I should have been in my grave. Here, thank God, I enjoy at least moderate health.'" These words are evidently intended to be a crusher to our author's theory. The experiences of one or two men in reference to some cases of chest complaints, the particulars of which are all unknown, is flung at an anxious public as a triumphant answer to *statistics* bearing on a great national health question.

Throughout both works, Dr. Thomson has philosophically eschewed "experience." We doubt not that, on this score, for every so-called case of cure quotable by the writers in question, he could recite a corresponding number in the opposite direction. From *our* recollection, we could also supply him largely with sad experiences. But are statistics, gathered under Government authority, from broad surfaces and during long periods, to be negatived—set aside as worthless—either by the "experience" of a few isolated laymen confessedly incompetent to diagnose the cases to which they refer, or by medical men, who prove their disqualification to witness on such a subject by their rejection of the only true test—"the numerical method"—to which "the external causes of disease, and the means of their prevention," can be subjected? If the question of *Phthisis* in Australia cannot finally be settled by *statistics, then all other statistics are valueless.* For it will not surely be asserted that they are either indispensable, or valuable in reference to any other question, except this important one? A large portion of the public revenue is annually spent in maintaining an extensive staff, for the special purpose of procuring and registering every kind of statistics. Why, if "experiences" must dominate statistics, should a portion of the public wealth be squandered on that which profiteth not? Why, if the experience code be the true one, not have many useless offices at once closed, and the various grades of clerks, who must necessarily be wasting both time and money, given to them a chance of bettering themselves in the more useful walks of commerce or of speculation? Experience cannot decide the national value of a gold-field. Place the experience of the lucky and the unlucky ones against each other, and how then decide concerning the character of Australia as a gold-producing country? Nothing short of gold statistics can settle the question. So with Phthisis. And, therefore, until the *statistics* produced by Dr. Thomson have been proved inaccurate, or his reasoning on them shown to be fallacious, his books are entirely unanswered; they continue a dignified public admonition—an impregnable fortress of science frowning defiance at the small fusillade of personalities and experience. "Common sense, prudence, and experience" demand "a dry, pure, mild, warm climate" for consumptive patients; and affirm that such is the climate of Victoria. The *ergo* in that case is obvious enough.

The following statements, by Dr. Waters—no doubt based on carefully prepared *statistics*—contrast strangely with the foregoing. Be it borne in mind that the Doctor pronounces on *data*, the reverend layman writes out of his own head: "I wish to impress upon your minds another fact, namely, that the countries which are most exempt from the ravages of phthisis are not the warm countries, but those in which the annual mean temperature is somewhat low. Whilst, however, these colder climates present a comparative immunity from phthisis, there can be no doubt of its great prevalence in more temperate ones. Thus it appears that pulmonary consumption is a widely-spread and very fatal malady, but that the climates which are the coldest enjoy the greatest immunity from it. How far this circumstance is the result of mere climate, or how far certain conditions of existence have to do with it, I cannot now stop to inquire. At all events, its great prevalence in various climates disposes of the allegation that cold is a grand cause of the disease." (*Diseases of the Chest*, pp. 236-7-8.)

Let us add, a medical gentleman, of high character and great intelligence, in the far interior of Victoria, with whom we corresponded lately on the subject in question, informed us that he had carefully preserved the phthisis statistics of his practice for years. His official position gives him scope for very extended observation. The climate is warm, dry, pure; the population live much in the open air; they are amply supplied with good animal food, vegetables, flesh, fruit, and milk; yet, under these most favourable circumstances, the

phthisis death-rate is no less than nine and a decimal, or nearly ten. Revelations of this kind should awaken anxiety in the public mind, and lead medical science to inquire into the probable causes. Like Dr. Thomson, we make them in no unpatriotic or sensation-loving spirit. They are made in the true interest of our fellow-colonists. While on this question, we ask, are *statistics* to be left unanswered, and used only for the purpose of pointing a personality, or, if possible, to give spasmodic vigour to a quibble?

In the *Medical Journal* for November, 1870, there is an article on our author's book on "Phthisis." We make especial reference to it here for the reasons already stated, and because it has—not much to our suprise—found a place in that print. On its style, its spirit, and its logic we refrain commentary. Out of respect to ourselves, and the character of the periodical containing this paper, we cannot—even if otherwise we were capable—sink to the level of the article before us. Neither can we spare either space or time to reply to bald assertions, scurrility, and vindictiveness. Had a place been sought for the said review in any of our daily papers, we can readily conceive the terms in which an able and impartial editor would have refused it admittance. There is, in all respects, such a strong family likeness between it and the article read before the Medical Society of Victoria, which, in professional self-defence, made Dr. Thomson the author of "Phthisis," that we are irresistibly driven to the conclusion that both look too like children of the same parent for the least observant critic to be mistaken in the relationship. Therefore a very brief commentary on some of its phrases will be enough, as well for our taste as for our present purpose. "In an elaborate array of figures, it is shown, and, we believe, correctly, that phthisis has increased amongst our population of late years." This admission settles the whole question. Dr. Thomson asserted the *admitted facts* on the basis of statistics, but in no sense has he dogmatised on the cause. "We do not deny the one fact of the late increase of phthisis," yet the *actual denial* of that fact, in terms we forbear to criticise, compelled Dr. Thomson to appeal to a *tertium quid*—the only arbiter in cases where differences of scientific opinion exist—statistics. Verily they who would foist upon a credulous public baseless assertions as scientific facts need to be unrivalled tacticians, as well as to possess surpassing memories. "We do not wonder that Dr. Thomson's personal and professional experience of the treatment of phthisis in this colony is unfavourable." In no page of Dr. Thomson's books is there even indirect reference to his "personal and professional experience." He is too acute a reasoner, and his mind is of a too philosophical cast, to build a theory even of the least importance on a basis so narrow as the professional experience of any one medical man, not even his own, large and successful as it is. Throughout, statistics is his watchword. "He states that the majority of patients dying of phthisis here (not natives) had lived chiefly ten to twenty years in the colonies." The writer of these words forgets to say that they had been ill on an average for only two years. We speak on the authority of our author. They had, consequently, been on an average of from eight to eighteen years in the colony until phthisis attacked them unto death.

Is that the kind of evidence which is to prove our climate a specific in curing the disease whose advances, after the unhappy subjects had become acclimatised, it did not prevent, and whose fatal power it failed at last to arrest? "The reasons of the increase of phthisis in our population of late years are to be sought for in the conditions coincident with increasing population, which climatic conditions cannot wholly control. So long as human nature remains as it is, so long will the vices, the luxuries, and the miseries of large cities continue to produce certain results on their inhabitants in the finest climate under the sun." To all that we say, exactly so; and so says Dr. Thomson. But to the self-stultifying writer of these lines we say this more; why first deny the fact that phthisis has increased in our colony of late years; then proceed to *admit* fully what you *denied*; and finally plunge into a very vortex of *reasons* so as to account for the fact you *both deny* and *admit*? "[illegible] much for Dr. Thomson's argument. Now for his accuracy. He accuses Dr. Bird of falsifying the returns of cases treated in the Pentridge Stockade. We have ourselves consulted the official returns of Dr. Reed to the chief medical officer, and find that the figures quoted in the *Australian Medical Journal* are literally correct. Mr. Thomson tells us that all the 1000 patients treated for phthisis in the Melbourne Hospital in five years died." To

these sentences we say—1st. Dr. Bird's name is not once mentioned in either of Dr. Thomson's books. 2nd. The alleged accusation against Dr. Bird is a figment of the writer's brain. We will thank him to indicate the passage. 3rd. The ascription to Dr. Thomson of the statement that 1000 patients treated for consumption in the Melbourne Hospital all died in five years, is a wilful libel against our author, revealing too clearly, under the guise of fair criticism, the spirit whence it springs. These are Dr. Thomson's words: "Of 1000 cases, there was not one solitary instance of recovery. All died, or are modestly described as relieved, but cured, never." 4th. At page 71 of the book on "Phthisis," anyone anxious to know the facts on the specific point will there find a table contrasting the number given in the *Medical Journal* of cases treated at Pentridge, and the correct number returned by the Registrar-General, in which the discrepancy is glaring enough. It is no ideal of Dr. Thomson. It speaks trumpet-tongued of a something that some one would fain conceal or deny. We made reference to it in our former review. Further comment is therefore needless.

In bringing to a close this imperfect notice of a work whose statistics and deductions will yet form one of the standard references to future impartial and earnest inquirers into the subject of which they treat, we shall very briefly summarise a few of its teachings.

Sanitary improvements and the practice of pure morals can limit the spread of phthisis, and, no doubt, tend to diminish the originating *causes;* but in so far as statistics yet show, "have no effect on the ordinary inflammatory affection of the lungs." However the spread of the disease may be struck at by those methods, that it is, *per se*, incurable by mere climatic influences, our author is fully borne out in saying, by researches of the leading medical men of the age. Professor Von Niemeyer, of European reputation, says that "most of the prevailing opinions on the statistical statements as to the frequent occurrence of tuberculosis in general, its greater or less frequency under the influence of certain conditions, the geographical distribution of the disease, etc., have only a very limited value, because the observations on which they are founded refer by no means to tuberculosis alone, but also to all those processes which, since Laënnec's time, have been confounded with tuberculosis." (*Sequel*, page 23.) Again, Dr. Addison: "When albuminous effusions have proceeded to actual induration and consequent obliteration of the cellular structure of the lung, the notion of perfect repair can hardly, I think, be regarded in any other light than that of a pathological absurdity, although the statements advanced by some modern writers on phthisis would seem to imply that they actually expected the profession to believe in its practicability. The satisfactory solution of the important question of diagnosis in phthisical disease is calculated, above all things, to extinguish quackery, and silence the reckless pretensions which from time to time are brought forward to insult the understanding and shock the better feelings of every upright and really competent member of the profession." (*Sequel*, p. 24.)

At the Medical Congress at Lyons, in 1864, one of the first questions submitted for discussion was "Establish by undoubted facts the curability of pulmonary phthisis; separate, among the varieties of this disease, those which are amenable to cure and those which are incurable." The value of the undoubted facts of the alleged cure of any case adduced at the Conference could only be adequately judged of by a perusal of the statements made at the Conference. That they were inconclusive is evident. Until one authenticated case of cure, therefore, from mere climatic influence, when induration and its sequences have taken place, can be produced, these authorities and our author's statements remain sadly impregnable, and upon which the tables contained in Dr. Thomson's *Sequel* shed no uncertain light. Table I. shows a totality of deaths in Melbourne and the suburbs from consumption, during five years, of 2,143. Table II., excluding those born in the colony who died of phthisis, and those whose period of residence here is unknown, shows a totality of 1,167. In both cases, nine-tenths of the deaths from consumption were of persons who had been *not less than five years* resident in the colony; from that up to over thirty years—periods long enough surely for climatic influence to have wrought its cures, were it the specific contended for.

In discussing the supposed causes of a high rate of tubercular mortality, such as increasing density of population, defective drainage, dampness, over-crowded houses, etc., etc., Table III., has a special local value. It shows the ascertained number of deaths from phthisis

in particular districts. As seen from this table, it is worthy of remark that while South Melbourne has 824 deaths from consumption in five years, Prahran has only 56; North Melbourne, 352: St. Kilda only 40; Collingwood 281; South Yarra only 47; Emerald Hill, 103; Hawthorn only 37; Richmond, 134; Sandridge only 32. Medical science cannot be more grandly and humanely occupied than earnestly inquiring into the causes of these statistical differences—a better occupation, all good men will admit, than ignoring the figures of the Registrar-General, or sneering at the man who, awake to their value, calls public attention to what they indicate.

Passing over Table V.,—being warned by the space at our disposal—there are two particulars referred to by Dr. Thomson which require notice. The first, at page 28, states, on the authority of the Registrar-General, that in several Friendly Societies the number of deaths from phthisis is actually *over twenty-seven per cent!* We cannot quote what Dr. Thomson writes under this particular. His concluding remarks are: "The health histories of Friendly Associations thus afford corroborative testimony of a convincing kind towards proving how wonderfully little climatic, and how greatly individual, circumstances affect the induction of phthisis." (*Sequel* page 30.) The second is Table V., showing the occupation of persons in Melbourne and suburbs who died from phthisis during five years, beginning 1865. This tabulation, while showing the immense care with which Dr. Thomson has investigated his subject, is both curious and instructive. It bears out the melancholy fact he reluctantly speaks of—a high rate of tubercular mortality. On the difference of death-rate between different trades and callings, the table is very suggestive, and might form the starting point of an inquiry as to the probable causes. Is there anything in the nature of the trades and callings themselves, or in combination with the climate, or the locality in which they are carried on, or in the habits of the persons following them, to produce the difference of death-rate and the total high rate? What appears to us the most remarkable item is—farmers, 18 deaths from phthisis. It has been usual to associate this calling with special exemption from the disease. Indeed, farming life has often been recommended as a most fitting one for the consumptive.

With his usual candour, Dr. Thomson does not even speculate on the revelations of the tables. He gives then to the scientific amongst a series of other facts simply bearing in a general way on his views, and that they may be of use hereafter in further investigating the subject. In the case of the farmer, is there danger from the dead and decaying vegetable matter amidst which he operates?

Like all other theories, that of Phthisis during the last half century has undergone radical changes in the hands of *candid* medical men, close observers, and logical thinkers. In their hands, the treatment of the disease is wholly changed. It is but the obsolete, the commonplace, and the incompetent in the profession who advance not out of a past comparative darkness with the advancing lights of pathological progress, chemical discoveries, and the accumulative facts of statistics, as in this particular referred to by our author: "It is indeed a very ordinary supposition of ignorance that phthisis never is an acquired, but invariably is a hereditary complaint. This is but the consequent prejudice proceeding from a century of erroneous medical doctrine. The persistency of the fatal fallacy among the laity is little astonishing when so many professional men to this hour still cling to the idea. But so opposed is the belief in transmissive theories of tuberculosis to recent thought, that one of the profoundest masters disputes it altogether, maintaining, with much force of reasoning, that no specific diathesis, but only a certain feebleness of frame, is conveyed to offspring from parent, the subject of any exhausting malady." (*Sequel*, p. 7). Dr. Thomson concludes the very able *brochure* with some pertinent remarks on *Specialists* in the supposed curing of consumption.

And now, in bringing these somewhat lengthy remarks to a close—but less lengthy and worthy than the importance of the subject demands—we must compliment the Doctor on the admirable temper and philosophical spirit he has shown throughout his work in discussing the subject under review. Some of the criticisms that have appeared remind us of what we have read somewhere. An antagonistic reviewer, staggered by the reasoning of the works he wished to condemn, said to his friend, "What am I to do with the book, for I can't get over its arguments." "*Say he's abusive,*" was the conclusive reply. On this

principle, the *Victorian Independent* and the *Australian Medical Journal* heartily join issue. We have been taught to believe that, at least, all the officials among Congregationalists are men actually possessing religious truth and love. But the reviewer on "Phthisis," in the representative journal of the denomination, makes us exceedingly chary in accepting that teaching. The distinct charge it lays at Dr. Thomson's door against his *love of truth*, the censure it passes on the spirit in which he writes, and the assertion that he deals in declamation and personal feelings for an unworthy and unscientific purpose, tested by the phrasing and the actual spirit lying on the surface of every page of the book itself,—"Phthisis,"—may please a partisan or gratify a personal foe; but in no sense can either illustrate the Christianity it professes to represent, or content the mind of the jury before which our author and his reviewer stand—whether it be an intelligent public or candid men of science. With the two exceptions referred to, all other critics have been emphatic in their deliverances concerning the *temper* of the book, even when they hesitated to endorse its views. What fairer chance for an author, especially in the case of one moved solely in the cause of truth, to "hit out" than in connection with the following quotation:—"It deserves mention, that in the district in which the greatest mortality occurred (South Melbourne) the Melbourne Hospital is situated, and that in the same district there is the greatest number of blanks in the column for stating the duration of illness. Fortunately, the *hiatus* does not vitiate an inquiry completed without hospital data, valuable adjuncts though they undoubtedly would be."—(*Sequel*, page 17.) Surely the Melbourne Hospital, supported by public money, should contribute a *quid pro quo*, at least in securing the fullest possible statistics. The omission, from whatever cause, deserves the severest condemnation. Yet so happily free is our author from the temper of which he is accused, and so entirely devoted is he to the cause of truth and humanity, that he restrains himself, in the face of what one might call a "charming opportunity," and mournfully proceeds, unmoved, with the serious subject before him. With him it would be indeed, despite personal attacks and jaundiced criticism, "*Magna est veritas et prævalebit.*"

The following quotation will show fully the spirit of the author, and that in the *Sequel* the literary merits of the book on "Phthisis" have been admirably sustained:—"In closing this discussion for the present, it is, perhaps, painfully gratifying to know that every statement first put forth has been fully substantiated wherever additional evidence has been obtainable. In not one solitary point of any magnitude has there arisen the slightest need of retraction, qualification, or revision, the more extended examination intensifying rather than lessening the force of earlier impressions. On one or two trivial matters, a few words of further explanation might have been introduced; but as the topics could not well be reverted to without reopening undesirable controversy, it is surely better to leave them at rest. More satisfactory would it have been had the power of opposing facts shown that former statements were based on error, and that facts, by stronger facts assailable, could be controverted and refuted. But as they were not originally asserted in a spirit of destructive criticism, so now may they serve an honest purpose of getting at the truth. Neither reckless nor unguarded, they were nevertheless impugned by indolence, too proud and too idle to earn information; but although the light suddenly thrown upon the dark spot rather startled the dreamers, they have now had time enough to rub their eyes, and rise to healthier action."—(*Sequel*, page 34.)

Pulsations of the Fœtal Heart, and the Sex of the Child.—In an interesting statistical paper read before the Obstetrical Society of Edinburgh, Dr. J. Cumming states:—"When the pulsation varies from 120 to 140, the probability is that the fœtus will be a male, and when the pulsation varies from 140 to 160, the fœtus will likely be found to be a female. But there are some exceptions to these facts. In three cases in which the pulsation was from 150 to 160, the fœtus proved to be a male; and in fifteen cases in which the pulsation varied from 116 to 138, the fœtuses were found to be females. It therefore appears that there is less frequent variation in the pulsation in the male fœtus than in the female; or rather that there are fewer cases in which the heart's action exceeds 140 in the male, than that it falls below that number in the female.—*Edinburgh Medical Journal.*

THE AUSTRALIAN

MEDICAL GAZETTE.

MELBOURNE: FEBRUARY, 1871.

THE establishment of local dispensaries in some of the suburban districts, two years ago, was advocated and carried into effect on the ground that these institutions would relieve the pressure on the metropolitan hospital, and provide more effectually for the wants of the local poor. From the recently-published report of the Melbourne Hospital for the past twelve months, it appears that, so far as that institution is concerned, the principal, if not the only result of establishing suburban dispensaries has been, not the diminution of the pressure, but the reduction of its subscription list. Notwithstanding that many thousands have been provided with gratuitous attendance and medicine at the dispensaries established in the populous districts of Collingwood and Richmond, there is no decrease whatever in the numbers applying for assistance at the out-door, or dispensary department of the Melbourne Hospital. Such an unexpected result should make the public and the members of the profession pause to inquire whether, in many instances, the means adopted for affording gratuitous medical aid is not increasing the very evil it was intended to abate; otherwise, how comes it to pass that, although several thousands have during the last two years been provided with gratuitous medical assistance at the suburban dispensaries, the numbers applying at the metropolitan hospital have shown no diminution. We fear that much of the evil has been brought about by the action of the profession itself. Medical men have so long familiarised the public to the receipt of gratuitous attendance in every shape and form, that what was at first given as an act of benevolence or charity has at length come to be regarded as a matter of right, of which any member of the community, whether indigent or affluent, may avail himself.

We have no desire to say a word against the establishment of dispensaries in poor and populous neighbourhoods, provided they are rigidly restricted to the class for whom they are legitimately intended; a class which, in this community, should be very limited in number—the wages of the lowest grade of manual labourers being seldom less than five or six shillings per diem; a rate of remuneration sufficient to enable a provident labouring man to become a member of a benefit society, and place himself beyond the necessity of requiring dispensary assistance.

The history of medical charities, both in the United Kingdom and in Australia, proves beyond question that these institutions are peculiarly liable to great abuse and imposition. Large numbers of persons, who would be insulted by the offer of charity in other forms, are frequently to be seen attending as paupers at public dispensaries. The subject of gratuitous medical services is closely allied to that of medical charities. It appears to us that the principle, or rather the want of principle, on which the medical profession are expected to bestow a large portion of their time and energies on the various public and private charities, is unsound in theory and indefensible in practice. We know no reason why the members of our profession should be called upon to give an amount of gratuitous service not required from any other profession or body of citizens. In forming a proper estimate of the sacrifice required of the profession in this matter, it is necessary to recollect that, for a large portion of the services for which they are nominally remunerated, they are harder worked and worse paid than any other body of educated men. It is notorious that the club system, as at present carried out in Victoria, is extremely unjust to the members of the profession. While the medical officers of benefit clubs are wretchedly paid and harassed with work, it is well known that these societies are to a great extent composed of well-to-do artisans, wealthy traders, bankers, and others, for whom such institutions were never intended. The labouring classes—the legitimate objects of these semi-charitable institutions—are in a great measure unconnected with benefit clubs, and have to rely on the benevolence of the private practitioner, or on the public charities. If the constitution of society be such that the labouring classes are unable out of their own resources to provide for the ills to which flesh is heir, why should the medical profession be called upon to bear so large a part of a burden which is common to all. The medical men, as

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ORDERED BY THE LEGISLATIVE COUNCIL

OF ALL

THE DEATHS (2143) FROM PHTHISIS

In Melbourne and Suburbs,
During the years 1865—1869, and first half of 1870,

FORMING

A Sequel to the Essay on Phthisis,

ETC. ETC.

BY

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MELBOURNE:
STILLWELL & KNIGHT, 78 COLLINS STREET EAST.
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PREFACE.

The original theme of the Essay to which this is supplementary was the proof of a statement which had been called in question—to wit, the great prevalence of phthisis in this place. The inaccessibility of certain statistical information having caused that Essay to be to a certain extent incomplete, the author has, through the interest which it excited, been enabled by legislative action, to supply the hiatus; hence the present publication, from which it will be seen that, as was stated at the outset, of 22,282 deaths from all causes, in Melbourne and suburbs, during five and a-half years, 5,132 occurred between the ages of 20 and 45 years, and that of these 1,563 or nearly 1 in 3 were from phthisis.

The following summary of the contents of the Parliamentary Return referred to has been prepared with the most scrupulous care; but should it be deemed necessary to test its accuracy by a reference to the original documents, these will be found to show that the digest could not possibly have been more completely trustworthy even if it had been compiled under immediate official supervision.

W. T.

PROCEEDINGS OF THE LEGISLATIVE COUNCIL.

TUESDAY, NOVEMBER 1, 1870.

STATISTICS OF PHTHISIS.

The Hon. J. CUMMING moved: "That there be laid upon "the table of this House a return from the Registrar-"General of the numbers who had died from phthisis in "Melbourne and its suburbs, during the years 1865-6-7-8-9, "and also during the first six months of 1870; specifying "the district, sex, age, occupation, place of birth, dura-"tion of illness, and period of residence in Australian "Colonies."

Mr. T. T. A'BECKETT said the return would be very voluminous if it were made out for the whole colony; but as it was required for scientific purposes there would be no objection to furnish it, provided statistics were made out for Melbourne and suburbs only.

Mr. CUMMING replied that he would accept a return for Melbourne and the suburbs only, and the motion was agreed to.

TUESDAY, DECEMBER 6, 1870.

DEATHS FROM PHTHISIS.

The Hon. T. T. A'BECKETT laid on the table, pursuant to order of the House (dated November 1), a return from the Registrar-General of the number of persons who had died from phthisis in Melbourne and its suburbs during the years from 1865 to 1869, both inclusive, and also during the first six months of 1870, specifying the district, sex, age, occupation, place of birth, duration of illness, and period of residence in the Australian Colonies.

The return, which, though very voluminous, was unaccompanied by any summary of its contents, was ordered to be printed.

SUPPLEMENT.

"Phthisis is very common and malignant in Australia."
DR. WATERS.

Two thousand one hundred and forty-three deaths from phthisis in five and a half years, in a population of a hundred and seventy thousand, is a high ratio, showing almost beyond the need of further comment, the extent to which the disease prevails in this part of Australia.

It has already been explained why certain questions concerning that large mortality scarcely admitted of complete answer from the few statistics at public disposal, there being no authority for allowing access to more without special order of Parliament. Returns for the first quarter of the year 1870 only were available, but as that short period might

have been exceptionably unfavourable or the reverse, the questions were left undecided till further returns were had. These have now been obtained, for early in the past session an order was passed for a list of the leading details of all deaths from phthisis, in Melbourne and Suburbs, during the last five and a half years. The list is now printed as compiled by the Registrar-General, and is thus an authentic document, easily accessible to all. Analyses of details can now be made, to ascertain how far results meet the requirements of the investigation, and show how widely general experience differs from commonly held belief.

This method of investigating the causes of a widely prevalent malady is the true one, according to the opinion of one of the most philosophical physicians of his age or country—a physician whose philosophy is still a guiding principle in modern medicine. Of this method Dr. Alison observes :—

"It is, however, generally agreed among "medical men, that to questions regarding the "external causes of disease and the means of "their prevention, statistical evidence, or the

"numerical method of inquiry, is chiefly applic- "able, and on a little consideration of such "questions the reason of this is usually "sufficiently obvious."

Adhering to these sound principles of discussion, the writer refrains from adducing illustrative examples, and refuses to listen to particular histories, for or against the main argument; preferring to abide by the results of evidence drawn entirely from public records open to all, and disregarding accounts of isolated instances.

Many examples could be given of the wisdom of this rule, where one may suffice. An appeal was made by a physician of the Brompton Hospital, for the Colonial Office to organize a large scheme of emigration of consumptive people to these colonies, on the plea that one of his patients had been cured by an Australian climate. So earnest were the representations of this supposed cure that, through the liberality of the Emigration Commissioners, a special correspondent was despatched to make further inquiries on the spot. The results of this singular mission were to have been communicated to the Colonial Office, but they have never

been given to the world, the early demise of the person whose reported cure formed the hypothesis for the proposed experiment prematurely ending the project. The novel mode of giving publicity to a particular instance of the curative power of the climate shows the necessity of exacting proof. Here was a widely published case of alleged cure by change of climate, held forth as an inducement to others to adopt the same course, publicly urged upon Government as a reason for its authoritative action, by medical men in positions giving such weight to their assertions as almost compelled concession; and yet the whole string of argument spun from the "cure" of one who was quietly resting in the grave! Painful as it is to re-awaken references of this kind, dragging as it were from silence of the tomb the memories of the dead, necessity yet justifies the allusion. This is not done in idle discussion of a frivolous topic or in levity; but in a crusade for truth, involving in all candour questions of life or death, suffering or relief from suffering, aggravated or ameliorated disease. Into such it is not unpardonable to import any one sad case injudiciously exalted

into a typical illustration of the healing virtue of a climate, and as such challenging universal public attention, when it serves to prove, rather, that public data are the only admissible evidence. In finally disposing of a painful theme, and deeply regretting that any turn of discussion should constrain to violate what must ever be held sacred, whatever further allusion may be made in all sincerity to individual cases, on this occasion the truth shall be tested solely on the principles laid down by Dr. Alison as the only valid method. Some may attach infinitely more significance to one case the minute history of which may happen to be intimately familiar to them, than they would concede to accurate accounts of a thousand others whose details can only be gleaned from a few leading facts noted down in public records; but such people are exceptional in their modes of logic, in their oddity not greatly disturbing the general current of convincing facts.

As the mortuary returns examined at the Melbourne Hospital extended over a term of five years, affording ample scope for fair averages, and tests of the increase or decrease

of numbers affected, so should the returns of the general population embrace a like sufficiently long period, to yield facts enough to warrant a deduction. By this alone can the errors of a single quarter be covered. It is not now difficult to find how many deaths took place in and outside the hospital, from the same disease during the same space of time. The extra half year has been included, to bring the inquiry to the latest date.

In making such a summary of this long list of two thousand cases, as will tell their instructive tale in a simple way, they have been arranged to show length of residence and duration of illness, that, by comparing the two factors, it may be found what proportion had come to the colony in health, how long they had remained so, and how many had most probably, or certainly, arrived in hopeless sickness. It may possibly be objected to any conclusion from this comparison, that many of the cases, for aught that appears in their histories, may have had, at the time of arrival, what is frequently spoken of as "the seeds of the disease" latent —for metaphors and medical theories always

indulge one another; or, it may be averred that, an active disease may have been checked temporarily, before the fatal renewal, and there is nothing uncommon in so arguing against facts by mere conjectures and fanciful assumptions. It is indeed a very ordinary supposition of ignorance that phthisis never is an acquired but invariably is a hereditary complaint. This is but the consequent prejudice proceeding from a century of erroneous medical doctrine. The persistency of the fatal fallacy among the laity is little astonishing when so many professional men to this hour still cling to the idea. But so opposed is the belief in transmissive theories of tuberculosis to recent thought, that one of the profoundest masters disputes it altogether, maintaining with much force of reasoning that no specific diathesis, but only a certain feebleness of frame, is conveyed to offspring from parent, the subject of any exhausting malady. Others, in reply, say this weakness may still be called diathesis; but that would be an unscientific misnomer. Several distinct chronic diseases may equally give a feeble progeny, but could not all transmit a diathesis; they may all

confer the delicate constitution upon which disease is easily engrafted, but could not all convey one and the same specific poison of tuberculosis. Of the two forms the acquired is usually the more acute and fatal, yet is the more amenable to early treatment.

As far as the facts supplied by those two thousand cases warrant a decision on questions under consideration, that decision is conclusive enough; but so contrary is it to the ordinary reputation of the climate for great salubrity, that judgment hesitates before pronouncing the severe verdict. In deciphering the facts, it plainly appears that an enormous majority had been many years in the colony before being overtaken by fatal illness. The average period of residence in the Australian colonies of persons not born there appears to be above eleven years; while the average duration of illness of all classes is less than one and a-half years, thus showing a term of about ten years of health. There is, doubtless, often an ambiguity as to the date of onset of disease, but as the dates are always given at the registration of the cause of death, the burden of proving them inaccurate rests

with those who impugn their accuracy. In deciding between probabilities, the least improbable must be accepted. In dealing with facts, the simple enough conclusion is, that of the whole two thousand cases, the persons had been on an average ten years in the colony before being affected.

If it be doubted whether the length of illness be correctly estimated, or thought that a longer term must be allowed for the average duration, then it will follow that a vast number of phthisical people must constantly reside about this city. If the average should rise from a little over one year to, say, four years or more, as some contend, then, to give 400 deaths per annum there must be at least some 1600 or more such patients always about; and if to these be added the great numbers supposed sometimes to be in a favourable way of becoming cured, and in addition there be also included the very many cases which are in the course of every year sent by medical men or friends for various reasons away from the colony, to other colonies and to Europe, the grand total of phthisical people usually dwelling in or immediately around

Melbourne would approach to nearly 2000, at least, of whom the greater portion would be adults under middle age. But surely the estimated duration is much more probably correct than that which would require so great a multiplication of cases to sustain it.

In Table I. (p. 12), prepared after carefully collating the returns, the length of residence and duration of illness are contrasted, at short intervals; those cases where no exact information is given are separated and marked off as unknown, and amount to about a third of the whole number. Of this large proportion nothing definite can be stated. Life, in some instances, may have been prolonged, or, like the majority, the term of illness may have been brief; it is gratuitous to assert and idle to conjecture, except from analogy of the many, respecting whom precise statistics have been elicited. Of the total number, 186 were natives, of European parentage, and in nearly all the disease had lasted less than one year; from which it would appear that in them phthisis is not a lingering illness, a fact that will excite apprehension for the future. The paucity of facts among the few

natives who have yet reached adolescence may not justify a final opinion; but enough exists to put people on the alert. From the approaching generation more data will necessarily be forthcoming, but it will neither be honourable for the medical profession nor creditable to the prescience of statesmen should those data prove unfavourable. If any value be attached to the warnings of such men as Simon, they at least should have a hearing, as to the measures required to prevent that result.

The second table (p. 14) will be found to show that, after excluding all whose residence and illness were unspecified, and also those born in the colonies, the large number of 1167 are left to supply dates for contrasting the average length of residence with the average duration of illness. By this selected number it is plain that only a very small proportion have been under one or two years in the colony, by far the greater number having evidently been long resident before health had given way to disease evidently acquired during the period of residence. Such, at all events, is the information conveyed by statistics.

TABLE I.

MELBOURNE AND SUBURBS—*Deaths from Phthisis during the years 1865-6-7-8-9, and also during the first six months of 1870; shewing the Duration of Illness and Period of Residence in the Australian Colonies.*

Period of Residence in the Australian Colonies.	Total Deaths from Phthisis.	Duration of Illness.																						
		Under 1 Month.	1 Month and under 3 Months.	3 Months and under 6 Months.	6 Months and under 12 Months.	Some Months.	1 Year and under 2 Years.	2 Years and under 3 Years.	3 Years and under 4 Years.	4 Years and under 5 Years.	5 Years and under 6 Years.	6 Years and under 7 Years.	7 Years and under 8 Years.	8 Years and under 9 Years.	9 Years and under 10 Years.	10 Years and under 11 Years.	11 Years and under 12 Years.	12 Years.	Some Years.	Long Standing.	Unknown.
Under 1 Month	24	...	4	2	...	...	3	3	2	...	...	...	...	...	...	...	...	...	1	...	9
1 Month and under 3 Months ...	26	...	1	...	2	...	1	2	1	...	1	...	...	...	...	...	...	...	...	...	18
3 Months ,, 6 ,, ...	22	...	...	...	1	...	3	3	...	...	...	...	...	...	...	...	...	...	...	1	14
6 ,, ,, 12 ,, ...	33	...	...	2	3	...	...	6	4	...	...	...	...	...	...	...	...	...	...	...	18
Some Months	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5
1 Year and under 2 Years ...	48	1	1	7	6	...	8	4	...	...	...	...	...	...	...	...	...	...	...	...	21
2 Years ,, 3 ,, ...	61	1	2	3	8	...	3	7	4	1	...	...	...	...	...	...	...	...	...	...	32
3 ,, ,, 4 ,, ...	55	2	2	5	10	1	3	5	2	...	2	...	...	...	...	...	...	2	...	...	21
4 ,, ,, 5 ,, ...	54	1	1	4	7	...	7	2	2	1	...	...	...	...	...	...	...	1	...	...	28
5 ,, ,, 6 ,, ...	65	1	4	5	13	...	4	5	6	...	2	...	...	...	...	...	...	...	...	...	25
6 ,, ,, 7 ,, ...	64	...	...	3	14	...	13	9	2	1	...	...	2	...	...	...	...	...	...	...	20
7 ,, ,, 8 ,, ...	80	3	2	5	15	1	14	7	3	2	2	...	1	...	...	...	...	...	...	...	25
8 ,, ,, 9 ,, ...	73	1	5	7	14	...	13	6	...	...	1	...	...	...	...	...	...	...	...	...	26
9 ,, ,, 10 ,, ...	77	2	3	6	14	...	7	7	3	...	...	...	...	...	1	...	...	2	...	...	32
10 ,, ,, 11 ,, ...	132	2	5	10	19	2	23	13	7	1	1	1	...	1	...	...	...	1	...	1	45
11 ,, ,, 12 ,, ...	103	3	4	10	10	...	19	9	3	2	1	...	...	1	...	...	...	1	2	...	38
12 ,, ,, 13 ,, ...	163	1	3	20	27	...	24	19	6	4	2	1	1	...	1	...	...	...	2	1	51
13 ,, ,, 14 ,, ...	123	2	4	8	15	1	21	9	6	4	4	...	1	...	...	...	...	...	2	1	45
14 ,, ,, 15 ,, ...	150	2	3	12	26	3	25	13	10	3	2	...	...	1	...	...	...	...	...	...	50
15 ,, ,, 16 ,, ...	101	2	6	9	19	...	15	8	7	4	2	...	...	...	1	1	...	...	4	1	22
16 ,, ,, 17 ,, ...	86	3	4	5	14	1	13	13	2	2	1	1	...	1	...	1	1	...	1	...	23

17 ,, ,, 18 ,, ...	72	2	5	10	7	1	11	7	1	3	2	1	...	...	...	...	...	...	1	...	21
18 ,, ,, 19 ,, ...	34	...	1	6	5	1	5	4	2	...	1	1	...	...	...	...	...	...	1	...	7
19 ,, ,, 20 ,, ...	23	1	...	2	4	1	4	4	1	...	1	...	...	...	...	...	...	...	...	...	5
20 ,, ,, 21 ,, ...	32	...	1	1	4	...	3	5	2	...	2	1	...	...	...	...	...	...	...	...	13
21 ,, ,, 22 ,, ...	17	...	...	1	3	...	4	1	1	...	...	...	...	...	...	...	...	...	...	...	7
22 ,, ,, 23 ,, ...	15	1	...	1	6	...	2	2	...	...	...	...	...	...	...	...	...	...	...	...	3
23 ,, ,, 24 ,, ...	13	...	...	...	4	...	1	1	...	...	...	1	...	...	...	...	...	...	...	...	6
24 ,, ,, 25 ,, ...	13	...	...	3	3	...	2	1	...	1	...	...	...	...	...	...	...	...	...	...	3
25 ,, ,, 26 ,, ...	15	...	1	1	1	...	2	2	1	...	...	...	...	...	...	...	...	...	...	...	7
26 ,, ,, 27 ,, ...	11	...	1	1	1	...	2	...	1	2	...	...	...	...	...	...	...	...	...	...	2
27 ,, ,, 28 ,, ...	14	2	2	2	3	...	...	3	...	...	...	...	...	...	...	...	...	1	...	...	3
28 ,, ,, 29 ,, ...	15	...	2	2	2	...	3	1	1	...	...	...	...	...	...	...	...	...	...	...	4
29 ,, ,, 30 ,, ...	6	...	...	1	1	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	1
30 ,, ,, 31 ,, ...	11	1	1	...	...	...	3	1	...	...	...	...	...	...	1	...	...	...	...	...	4
31 ,, ,, 32 ,, ...	2	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32 ,, ,, 33 ,, ...	5	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3
33 ,, ,, 34 ,, ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...
34 ,, ,, 35 ,, ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
35 ,, ,, 36 ,, ...	4	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	2
36 ,, ,, 37 ,, ...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37 ,, ,, 38 ,, ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
38 ,, ...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
40 ,, ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
41 ,, ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
46 ,, ...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...
47 ,, ...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Several Years	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Born there	186	7	17	32	36	1	25	9	7	3	1	...	...	...	...	...	...	1	...	47
Unknown	99	18	7	11	6	1	7	3	2	...	1	...	...	...	...	...	...	...	1	42
Total	2,143	57	92	200	327	14	298	195	89	34	29	7	4	5	3	4	2	2	21	6	754

Average period of residence in the Australian Colonies of persons not born there, 11.34 years.
Average duration of illness (all classes), 1.325 year.

TABLE II.

MELBOURNE AND SUBURBS.—*Deaths from Phthisis (excluding those of persons whose period of residence in Australia, or the duration of whose illness, is unknown; also those of persons born in the Australian Colonies) during the years 1865-6-7-8-9, and the first six months of 1870: showing the Duration of Illness, and the Period of Residence in the Australian Colonies.*

Period of Residence in Australian Colonies.	Total.	Duration of Illness.				
		Under 1 Year.	1 Year and under 2 Years.	2 Years and under 5 Years.	Total under 5 Years.	5 Years and Upwards.
Under 1 Year	44	15	7	21	43	1
1 Year and under 2 Years	27	15	8	4	27	
2 Years ,, 5 ,, ...	86	47	13	24	84	2
Total under 5 Years	157	77	28	49	154	3
5 Years and under 10 Years	229	118	51	51	220	9
10 ,, ,, 15 ,, ...	433	192	112	109	413	20
15 ,, ,, 20 ,, ...	320	109	48	58	215	15
20 ,, ,, 30 ,, ...	101	50	22	25	97	4
30 ,, and upwards	17	7	5	2	14	3
Total	1,167	553	266	294	1,113	54

As the causation of phthisis becomes more and more one of the great problems that "wait on dense population," it is desirable that the facts brought out in this parliamentary return should contribute towards its solution. For this purpose the numbers of deaths from phthisis in every one of the various districts have been separately tabulated. To those who are familiar with these districts, it will readily appear that the greatest mortality is invariably in the most densely crowded localities; but it would be utterly impossible at present to calculate what relation that mortality bears to actual population on a given area; and it is therefore expedient to defer this task until after the next census, to be taken early in April, when it will be an easy matter to accomplish it. In the meantime the publication of the subjoined table will facilitate the work for any one disposed to undertake it.

Much invaluable information on the point will be found in a most skilfully-written paper by Mr. Hammack, in the volume for 1859, of "The Transactions of the Social Science Association," where facts upon facts are furnished in evidence of the tendency of the deaths from phthisis

to increase with the density of population, irrespective of all climatic peculiarities. Mr. Hammack had, indeed, to explain how consumption must not be looked upon as a disease peculiar to the English climate; and that "density of population exercises a powerful "influence in producing a high tubercular "mortality." So fully is this element in the causation of phthisis recognised, that the best writers discuss all other elements with direct reference to it. Thus, Dr. Waters, in reviewing the various arguments employed to prove a certain immunity from phthisis by the inhabitants of places at great altitudes, as in the high table-lands of different countries, observes, "I have little doubt that, *per se*, the climate "of these higher regions does not confer "immunity from the disease, and that, under "circumstances of dense population and over-"crowding, we should see the disease largely "developed."* Even Dr. Herman Weber himself, who was amongst the earliest advocates, if not the actual originator of the idea, does not attribute the exemption solely to alti-

* Diseases of the Chest, p. 241.

tude, distinctly stating as he does in his original paper that he "might mention many other "circumstances of great importance, amongst "them the scarcity or density of population."* In the lower lying often damp places in some large towns, land is usually less costly and rents low, houses small and crowded, drawing together a dense population, among whom new causes come into operation that are unknown in the elevated places referred to. The following table (Table III.) has thus a peculiar interest in this aspect of the discussion of the causes of phthisis in this colony.

It deserves mention that in the district in which the greatest mortality occurred, South Melbourne, the Melbourne Hospital is situated, and that in the same district there is the greatest number of blanks in the column for stating the duration of illness. Fortunately the hiatus does not vitiate an inquiry completed without hospital data, valuable adjuncts though they undoubtedly would be.

* Med. Chir. Trans., p. 229, 1869.

TABLE III.

MELBOURNE AND SUBURBS.—*Deaths from Phthisis in each District during the years 1865-6-7-8-9, and first six months of 1870.*

Districts.	Totals.	1865.	1866.	1867.	1868.	1869.	1870 (6 months).
Brighton	25	3	3	5	5	6	3
Brunswick	23	4	2	6	1	4	5
Caulfield	3	1	...	...	...	1	1
Cheltenham	7	...	...	1	...	...	2
Collingwood	281	48	48	48	43	61	28
Emerald Hill	103	15	17	26	17	21	7
Essendon	6	2	...	2	2	...	...
Flemington	10	3	...	3	1	2	1
Footscray	11	3	1	2	2	1	2
Hawthorn	37	10	5	9	4	10	3
Heidelberg	10	...	...	2	1	1	1
Keilor	2	...	...	...	...	...	1
Kew	18	4	4	1	4	5	...
Malvern	5	...	...	1	1	...	...
Melbourne North	353	58	53	54	56	73	21
Melbourne South	824	135	133	143	157	178	58
Northcote	49	4	15	8	17	18	3
Penridge	17	5	2	3	3	2	2
Richmond	56	9	11	11	10	8	7
Sandridge	134	33	19	21	23	26	12
South Yarra	38	13	2	8	10	10	3
St. Kilda	47	14	6	4	7	12	4
Toorak	40	3	5	15	2	9	6
Williamstown	48	1	...	1	...	1	1
Total	2,143	366	347	378	376	448	218

A most material point now presents itself for consideration. Were those 2143 deaths all cases of true phthisis? If it be not possible to trust the diagnosis the matter is at an end. Once admit this doubt, and no more need be said on the question. In similar inquiries the validity of such a doubt is admitted, and, for the purpose of a comparative estimate of its prevalence in different places, phthisis has been classified along with other diseases of the respiratory organs. This method was adopted by Dr. Headlam Greenhow, in a study of the statistics of public health,‡ because the correct discrimination of chest affections is often a difficult matter, requiring an amount of attention and practice, the possession of which cannot always be relied upon. For this reason alone several diseases of the lungs were joined to phthisis, forming a group of pulmonary affections. This at once got over all difficulties of differentiating diagnosis, but it also ignored the existence of different pathological conditions with distinguishing symptoms, as described by all authors, and pre-eminently in the excellent treatise on

‡ Trans. Soc. Sc., 1857, p. 371.

Chronic Bronchitis and allied affections, by Dr. Greenhow himself, wherein the differences between bronchitis and ordinary phthisis are closely discussed. If, however, phthisis is to be thus held as not easily definable and separable from other lung affections, because its most frequent origin is in catarrhal pneumonia, bronchitis, and allied inflammatory diseases, as many pathologists, with Addison, Sanderson, and Niemeyer, aver; and rarely if ever in what has been, since Laënnec's time, called the tubercular diathesis, a form of scrofula; then this also must be conceded, that in this city the majority of ordinary pulmonary seizures that end fatally, run into some form of caseous degeneration and disintegration of lung structures commonly spoken of as phthisis. The aggregate of all affections of the respiratory organs is less here than in England, but not the proportion of phthisis. It must either be so, or the returns are all spurious and false, and the medical profession radically at fault. By analogy it is most probable that the returns are correct, and the profession in the right; for in some other countries similar relative proportions in the various pul-

monary diseases prevail, there being in some places greater mortality from ordinary inflammations of the lung structures than from phthisis, and *vice versa* in others.

In the former, acute inflammations tend to quick fatal termination; in the latter they seem to pass into cheesy deposits with subsequent phthisis, and eventually into tuberculosis. Whether this be, if in itself a true theory, a consequence of climatic influences or not, requires proof, but even if proven, it could not show the climate in which such secondary and tertiary pathological changes were frequent, to be exempt from phthisis because of showing on the amalgamating classification a smaller ratio of lung affections.

But most opposed to the plan of Dr. Greenhow, and of infinite practical value, is the clear statement of Mr. Simon, who in reporting to the Privy Council on the effect on phthisis of the drying of the sub-soil according to the suggestions of Drs. Buchanan and Bowditch, asserts that diseases of the lungs other than phthisis undergo no reduction from such improvements; and he states it axiomatically that "neither

"directly nor indirectly did the class of lung "diseases fluctuate according to the fluctuations "of phthisis." These facts show that phthisis can be influenced by sanitary improvements, and that the very improvements which limit the spread of phthisis have no effect on the ordinary inflammatory affections of the lungs.

Thus, then, according to the experience of Mr. Simon, as opposed to the mixing method, the cases of phthisis may be segregated from other diseases of the lungs, for all practical or scientific medical and sanitary investigations. The mixing method is clumsy and confusing, and in relinquishing all effort at scientific precision gives over in despair one of the gravest problems of sanitary work at a time when no means likely to rouse the comfortable and indifferent public to the task before them should be left unused.

Nor would this experience of Mr. Simon's be affected by the subdivision of what has till quite recently been set down as phthisis, into phthisis and tuberculosis, the former a common the latter a very rare disease; and although it must now be admitted that most of the observations made

upon this question relate to phthisis rather than to tuberculosis, the social and scientific import of them is in nothing altered. It is affirmed by Niemeyer, who draws this distinction between the diseases named, that "most of the prevailing "opinions on the statistical statements as to the "frequent occurrence of tuberculosis in general, "its greater or less frequency under the influence "of certain conditions, the geographical distri- "bution of the disease, &c., have only a very "limited value, because the observations on "which they are founded refer by no means to "tuberculosis alone, but also to all those pro- "cesses which, since Laënnec, have been "confounded with tuberculosis."*

The truth of the distinction some may doubt, yet it is such a very important explanation which warrants the saying by Dr. Gull that "the "word 'phthisis,' which has now too often a "specific value, will dilate so as to include a "whole genus of chronic affections, which, when "duly recognised and classified, will afford more "secure grounds of prognosis, and spare us the

* Lectures on Phthisis, p. 19.

"perusal of worthless records of so-called con-
"sumption cured."*

To a similar effect, the following opinions of Dr. Addison might be added, that:—"When "albuminous effusions have proceeded to actual "induration, and consequent obliteration of the "cellular structure of the lung; the notion of "perfect repair and restoration can hardly, I "think, be regarded in any other light than that "of a pathological absurdity, although the "statements advanced by some modern writers "on phthisis, would seem to imply that they "actually expected the profession to believe in "its practicability." * * * The satisfactory "solution of the important question of diagnosis "in phthisical disease is calculated, above all "things, to extinguish the quackery, and silence "the reckless pretensions which from time to "time are brought forward, to insult the under-"standing and shock the better feelings of every "upright and really competent member of the "profession."†

But if further proof were demanded of the true

* Medicine in Modern Times, p. 183.
† Guy's Hospital Reports, 1845.

phthisical character of the disease which caused those 2143 deaths, and that they were not from pneumonia or bronchitis simply, the ages of the persons would supply it. In the next table the ages have been arranged in quinquennial periods of years, in all cases over five years of age; and show that 1563 of the whole were between 20 and 45 years, and only 580 under 20 and over 45 years. Between 20 and 50 years of age there were 1731, and only 412 under 20 and over 50.

Now on comparing these ages with the ages at which bronchitis and pneumonia are most fatal, it is found that the largest mortality occurs from these latter diseases under 20 years and over 50 years of age. Both in England and in Melbourne more than one half of all the deaths from bronchitis and pneumonia occur under five years of age. The method of ascertaining the average age at death, by adding up the sum of the ages of those who die and dividing the aggregate among the number of deaths, is liable to very material error. To avoid this, the details are given.

TABLE IV.

MELBOURNE AND SUBURBS.—*Ages at Death of Persons who died of Phthisis during the years 1865-6-7-8-9, and during the first six months of 1870.*

	Males.	Females.	Total.
Under 1 month.	...	2	2
1 month and under 3 months.	1	...	1
3 months and under 6 months.	3	3	6
6 months and under 12 months.	6	5	11
Total under 1 year.	10	10	20
1 year and under 2 years.	15	7	22
2 years and under 3 years.	6	2	8
3 years and under 4 years.	3	...	3
4 years and under 5 years.	1	2	3
Total under 5 Years.	35	21	56
5 years and under 10 years.	8	7	15
10 years and under 15 years.	11	13	24
15 years and under 20 years.	33	54	87
20 years and under 25 years.	141	152	293
25 years and under 30 years.	190	161	351
30 years and under 35 years.	203	139	342
35 years and under 40 years.	207	142	349
40 years and under 45 years.	135	93	228
45 years and under 50 years.	111	57	168
50 years and under 55 years.	76	29	105
55 years and under 60 years.	37	20	57
60 years and under 65 years.	22	9	31
65 years and under 70 years.	11	12	23
70 years and under 75 years.	7	2	9
75 years and under 80 years.	2	...	2
80 years and upwards.	1	...	1
Age not specified.	1	1	2
Total.	1,231	912	2,143

In the adjoining table the deaths from congestion of the lungs are added to pneumonia, because they are so included in the English tables.

Table comparing the number of Deaths from Bronchitis and Pneumonia in England, and in Melbourne and Suburbs, during the year 1866, to show that, in both countries, over one half were children under five years of age.

DEATHS FROM BRONCHITIS AND PNEUMONIA IN ENGLAND AND WALES IN 1866.

Diseases.	At all Ages.	Deaths under 5 yrs. of age.
Bronchitis	41,334	16,305
Pneumonia ...	25,155	17,460
Total ...	66,489	33,765

DEATHS FROM BRONCHITIS AND PNEUMONIA IN MELBOURNE AND SUBURBS DURING 1866.

Diseases.	At all Ages.	Deaths under 5 yrs. of age.
Bronchitis	109	60
Pneumonia	102	41
Congestion of Lungs	65	45
Total ...	276	146

Those inflammatory affections are peculiarly fatal among children and old people, and as there are relatively fewer old people and more young children here than in England, the circumstance is from this difference in the composition of the two populations, easy enough of explanation, without reference to any climatic differences between the two countries. But the fact in no way affects the ratio from phthisis; because if that ratio be computed at given ages in each place, as from 20 years of age to 45 years of age, it would not alter the result if all the people in the colony were between those ages; the ratio would still continue at 1 in 3, as was before calculated.

There is another singular fact not hitherto referred to, but which should certainly not now be silently passed over, strongly indicating as it does the extent to which phthisis has prevailed in this community, and the class amongst whom it appears to be most common. In the returns of the various causes of death sent to the Registrar-General, by several Friendly Societies, the proportion of deaths from phthisis is beyond all expectation greater than it is amongst the

rest of the population. For example, in the year 1866 the total deaths from all causes were, among old and young members, male and female, 184, and of these 50, or over 27 per cent., were set down to phthisis. Again, in 1867, when the total deaths from all causes were 199, there were 40 deaths, or 20 per cent. of the total, from phthisis. When, therefore, it is considered that in those societies every member is presumed to undergo on entering, and again in exchanging from one society to another, a strict medical examination, before the society's medical officer, by whom the applicant must be pronounced healthy, and especially free from hereditary predisposition to phthisis, to become eligible for admission, this amount of phthisis is rather surprising. It may, perhaps, be replied that this medical inspection, which is meant to be conducted on the same plan as for life insurance, is often perfunctory and superficial, yet even a high degree of remissness would not fully explain why there should be so much phthisis among the members. It is uncertain whether this proportion be higher than among similar societies in England; nor can any means of ascertaining this be found in the

elaborate tables in Mr. Neison's work on the subject. It is, therefore, sufficient to indicate the enormous disproportion in the phthisis death-rate of those societies to that of the general population. The members are mostly artisans, living in the most densely crowded localities, and working in workshops and warehouses where usually little attention is bestowed on systematic hygiene, and supplying the very conditions spoken of by Mr. Simon as most frequently conducing to the occurrence of phthisis.

The health histories of Friendly Associations thus afford corroborative testimony of a convincing kind towards proving how wonderfully little climatic, and how greatly individual circumstances affect the induction of phthisis.

From a very cursory inspection of that section of the returns in which the different occupations are stated, it will appear how exceedingly varied these have been. Almost every profession, trade, handicraft or calling furnishes its quota, but the most frequently recurring in the list are precisely the same as are well known to furnish the largest proportion of victims to the malady in

other countries. Although the list is long it has been reproduced *in extenso*, because its indications may be extremely useful. The occupations of the males seem to be described with sufficient precision, but not so those of the females. Here indeed there is much that is eminently unsatisfactory from its vagueness. Thus, of the 1231 males, an occupation of some kind is mentioned in every instance except 61, in which only it has been omitted to be specified; but of the 912 females, in 21 none whatever is given, while 173 are simply set down as spinsters, 31 as widows, and 530 as wives, although it must be obvious that in numerous instances wives, widows, and spinsters had followed some vocation. This incertitude may or may not vitiate any argument, yet it is difficult to determine what general conclusion can be derived from this part of the analysis further than perhaps this, that married life would not appear to be highly auspicious for those females who are in any way liable, from exposure or predisposition, to become affected with phthisis.

TABLE V.

MELBOURNE AND SUBURBS.—*Occupation of Persons who died from Phthisis during the Years 1865-6-7-8-9, and the first six months of 1870.*

MALES.

OCCUPATION.	NUMBER.	OCCUPATION.	NUMBER.
Aboriginal	1	Coachbuilder	9
Accountant	5	Coachman	3
Actor	1	Confectioner	3
Agent	6	Contractor	6
Architect	2	Cook	9
Artist	3	Cooper	7
Auctioneer	1	Coppersmith	1
Baker	21	Cordialmaker	2
Banker	1	Corn Factor, Dealer	3
Barman	4	Cotton Mill Manager	1
Billiard-marker	2	Dairyman	3
Blacksmith	19	Dealer	8
Boatman	2	Draper, Draper's Assist.	17
Boilermaker	3	Draughtsman	1
Bookbinder	2	Drover	1
Bookseller	1	Engine-driver	2
Boot, Shoe Maker	34	Engineer	18
Boy (5 to 15 years)	19	Engraver	1
Brassfounder	1	Farmer	18
Brewer	1	Fireman	1
Bricklayer	6	Fisherman	1
Brickmaker	4	Flock Factor	1
Broker	3	Frenchpolisher	4
Builder	3	Fruiterer	2
Butcher	15	Gardener	15
Cab Proprietor	5	Goldbeater	1
Cabinetmaker	12	Goldsmith	1
Carpenter	29	Government Officer	2
Carrier	1	Grocer, Teadealer and Assistants	12
Carter	9	Groom	13
Chemist	9	Hairdresser	3
Child (1 year to 5 years)	25	Harnessmaker	2
Chimney Sweep	1	Hatter	3
Clergyman	3	Hawker	8
Clerk	85	Herbalist	1
Clicker	1	Hide Salesman	1
Coach, Cabdriver	12		

OCCUPATION.	NUMBER.	OCCUPATION.	NUMBER.
Hotelkeeper	24	Settler, Squatter	5
Infant (under 1 year)	10	Share Broker	1
Iron Merchant	1	Shepherd	2
Ironmonger	8	Ship Steward, Servant	5
Ironmoulder	1	Shipwright	4
Joiner	4	Silk Manufacturer	1
Laborer	161	Soldier	7
Lawyer	6	Solicitor	3
Lithographer	2	Stationer	4
Lodginghouse Keeper	2	Stevedore	2
Maltster	1	Stockman	3
Marblepolisher	1	Stoker	1
Mason	30	Stone Carver	1
Medical Man	6	Stone Cutter	2
Mem. House of Comns.	1	Storekeeper	7
Merchant	12	Storeman	7
Miller	2	Student	2
Miner	32	Superintendent	1
Musician	2	Surveyor	1
No Occupation	6	Tailor	22
Occupation not stated	61	Tallow Melter	1
Overseer	1	Tanner	1
Packer	1	Tin Plater	1
Painter	10	Tobacconist	2
Photographer	3	Toll Collector	1
Pianoforte Maker	1	Traveller, Commercial	8
Plasterer	3	Turner	4
Plumber	6	Upholsterer	5
Police	16	Vagrant	1
Porter	3	Vine Dresser	1
Poulterer	1	Vocalist	2
Printer, Compositor	26	Waiter	5
Prisoner	2	Warder	4
Quarryman	4	Wardsman	1
Railway Official	5	Warehouseman	9
Reporter	2	Watchmaker	4
Saddler	6	Wheelwright	4
Sailmaker	2	Whipmaker	1
Sailor, Ship's Officer	70	Whitesmith	1
Salesman	2	Wood Carver	1
Lawyer	2	Woolsorter	1
Schoolmaster, Teacher	14		
Scissors Grinder	1	Total Males	1,231
Secretary	1		
Seedsman	1		

FEMALES.

OCCUPATION.	NUMBER.	OCCUPATION.	NUMBER.
Barmaid	2	Milliner	1
Child (1 to 5 years) ...	11	Needlewoman	5
Cook	2	Nurse	2
Domestic Servant ...	76	Occupation not stated	21
Dressmaker	8	Shopwoman	1
Fancyworker	1	Spinster	173
Girl (5 to 15 years) ...	20	Tailoress	4
Housekeeper	8	Widow	31
Infant (under 1 year)	10	Wife	530
Machinist	4		
Mantlemaker	1	Total Females	912
Midwife	1		

In closing this discussion for the present, it is, perhaps painfully, gratifying to know that every statement first put forth has been fully substantiated wherever additional evidence has been obtainable. In not one solitary point of any magnitude has there arisen the slightest need of retractation, qualification, or revision, the more extended examination intensifying rather than lessening the force of earlier impressions. On one or two trivial matters a few words of further explanation might have been introduced; but, as the topics could not well be reverted to without re-opening undesirable controversy, it is surely better to leave them at rest. More satisfactory would it have been had the power of opposing facts shewn that former statements were based

on error, and that facts by stronger facts assailable could be controverted and refuted. But as they were not originally asserted in a spirit of destructive criticism, so now may they serve an honest purpose of getting at the truth. Neither reckless nor unguarded, they were nevertheless impugned by satisfied indolence too proud to earn information; but, although the light suddenly thrown upon the dark spot rather startled the dreamers, they have now had time enough to rub their eyes and rise to healthier action.

While no statement of fact nor inference has been confuted, the subject may be dismissed in the words of regret used by the father of modern Hygiene, Dr. William Guy, who on closing a similar discussion thus expressed himself:—
"The want of proper standards of comparison
"has obliged the writer to speak doubtfully upon
"points concerning which all would be glad to
"be able to offer a more positive opinion."

Surely, then, it is not untrue, that "There is no
"subject in the whole range of pathology which
"more urgently requires a thorough reform than
"that of pulmonary consumption." This is the opening sentence of the most recent clinical

lectures on phthisis. It refers to the dangerous tenets of medical doctrine up to this day taught in the medical schools as undisputed truths, and having in practice a most pernicious effect on the prevention and treatment of phthisis. It is significant that the needed reformation lies in the direction backwards to the teachings of Addison, whose unread or forgotten work, unread because of its peculiarity, is now restored, and its lessons no longer scouted, but accepted, since receiving a fresh afflatus of foreign inspiration.* Placing him side by side with the latest

* The identity of the teachings of Professor Niemeyer and Dr. Thomas Addison, is exhibited in the following quotations:—The former says:—"upon section of the "lung, small points of induration we almost always found "projecting above the surface of the cut in the shape of "yellow nodules. We must beware of immediately "assuming such minute solid spots to be tubercles. * * "Many objects which at first glance seem to be initiary "tubercles, and which were formerly regarded as such, "prove, upon closer inspection, to be transversely divided "bronchi with caseous contents. * * * By avoiding "such errors in post-mortem examination, we shall arrive "at the conclusion that not a single tubercle exists in very "many phthisical lungs." The latter said:—"On incising "such a lung, the truncated extremities of the more minute "tubes, have very often been mistaken for simple tubercles, "in consequence of their canals having been so encroached

great reformer, it is felt that in the one we study the thoughts of an original investigator into a newly struck vein of inquiry, and in the other read the skilfully marshalled arguments of a masterly reviewer. But author and scholiast are both needed to drive new truths into old heads, prostrate as the average *mens medica* usually is at the shrine of obsolete authority.

While reforming the pathology of pulmonary consumption, it is well that our leading pathologists are also reforming that injurious *specialism* which has so long been the chief obstacle to advancement in this particular department of medical practice. Of no disease equally with phthisis is it so essentially necessary to watch the inception, and guard against the onset, by efficient prophylaxis, and no class of medical

"upon, as to escape observation. * * * Such tubes, "when they contain puriform mucus, as they generally do, "are perpetually being mistaken for tubercles softening in "the centre."

To this, as to another opinion, Dr. Addison had probably "made few converts," though, nevertheless, he very likely "entertained no doubt whatever about the matter." Nor will others entertain much doubt, now that after five and twenty years the opinion is so fully corroborated, in language of remarkable similarity.

advisers can be so competent to do this thoroughly as those who are constantly observing, in their daily intercourse with their usual patients, the operation of the multifarious agencies of the malady, at periods of life and growth when the errors of nutrition and neglected hygiene that insidiously bring on the cachexia, or "vulnerability" of constitution, are too commonly made—a class of medical men sometimes superciliously spoken of as "*general practitioners*." It is they who see the beginning of the train of morbid processes, better than the mere specialist, who seldom witnesses those all-important initiative stages, because, being only a "*consumption curer*," the disease is seldom brought under his notice before it is fully formed and past the power of remedy, and when for him it merely remains gravely to shake his head and dolefully say "too late, too late," or worse still, excite delusive hope while plying useless nostrums. It is the former who should be masters of the whole subject.

"*Principiis obsta. Sero medicina paratur*
Cum mala per longas convaluere moras."

If they be not fully conversant with their business, but evade their responsibility and relegate

their work to others, then two different classes in the profession are passive agents in spreading the disease—the one from ignorance, the other from lack of opportunity—one from ignorance making patients whom the other from lack of knowledge cannot cure. If ever phthisis is to be sensibly diminished, it will only be through the masterly efficiency of the ordinary medical adviser, the "doctor" *par excellence* of our vernacular idiom, but the "*general practitioner*" of legal slang and the cant of specialism.

In the wide range of the medical art there is no other subject about which error has so deeply imbued the minds of specialists. It is not unnatural that their prejudices grow inveterate, because the public trust to them, as they treat the disease—by the overwhelming influence of a name. In therapy and pathology alike has specialism ever hindered improvement and retarded progress, by implicit obstinacy in abiding by names instead of intellectually studying things. It is a psychological corollary that minds of one idea should drop into the unity of specialism.

Dr. Thomas Addison, who was what Niemeyer

now is, a general physician, and who, because he would not become a specialist, was enabled to add several new forms of disease to the nosology—that is to say, to define the previously undistinguished—hopelessly strove to point out to the specialists of his time "the dangerous tenets of the doctrines" which absolutely governed them. But against their opinions his demonstrations were unavailing, his labours were vain, and had almost been forgotten, when a "renewed study of the whole question" reinstated them to a just appreciation.

This instructive episode in the mutations of medical opinion should teach specialists to be very diligent in searching for better knowledge of what they would fain set themselves up as final judges, and a little less dogmatic in asserting the superiority of their stereotyped systems.

Many are beginning to adopt an intelligible theory of phthisis for the fundamentally wrong principles followed by them for fifty years, in routine treatment of the disease. Yet all that while they had been inculcating the idea into the public mind how that they alone held exclusive

possession of the key to the treasury of knowledge, and so plausibly, that their specious arguments obtained public credence; which having easily secured, it is not very wonderful that they rested quite satisfied with the doctrines of phthisis as taught to them in their early days.

Before concluding it may be expedient to anticipate a possible objection which may be raised against trusting too much to accuracy of diagnosis. But errors in this direction do not greatly vitiate statistics, because, as could be shown by numerous instances in the experience of others, as well as many that have come under the writer's personal observation, mistakes of this kind both lessen and increase the number of recorded cases. As in all sciences of observation, there is in medical diagnosis an impossibility of absolute accuracy in a total number, arising from the individual peculiarities of observers. Even among astronomers allowance has to be made for such causes of difference; but as in that most exact of sciences, so is it in the less perfect science of medicine, found by experience that there is, in errors of observation, an

adjusting or compensating quality, producing in the aggregate result a true mean.

It will have been observed that free use has been made of citations, wherever it was prudent to enforce a point indisputably in the words of the wisest and the best men who have become foremost as instructors of the whole profession.

Having done so, we trust that those who had not sufficient faith to accept the arguments adduced in the work to which this is supplementary, will in a right spirit receive the additional facts which are now put before them; and that they will in all candour feel able to arrive at a clearer opinion than before on the subject which has been on their behalf so amply discussed.

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