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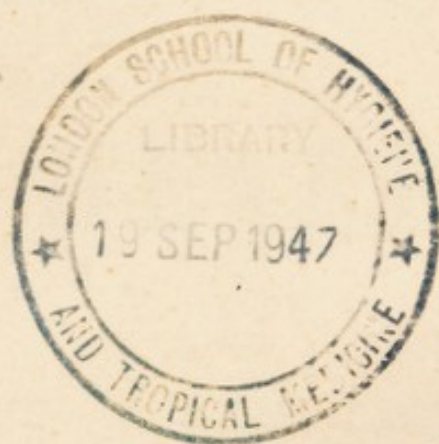
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BOROUGH OF NEWCASTLE-UPON-TYNE.

REPORT

OF THE

PUBLIC HEALTH,

DURING THE YEAR 1866.

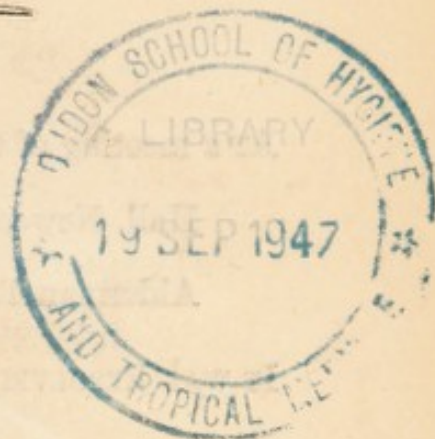
PRESENTED TO THE COUNCIL

1867,

AND ORDERED TO BE PRINTED.

Newcastle-upon-Tyne :

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At a meeting of the PUBLIC HEALTH COMMITTEE, held in the Town Hall, Newcastle-upon-Tyne, on the 4th day of October, 1866,
Alderman THOMAS WILSON in the chair,

IT WAS RESOLVED—

That a sub-committee be appointed to inquire into the number of the houses in the borough let in tenements; their water supply, ventilation, ashpit and privy accommodation, and drainage; the number of their occupants, and the cubic space allowed for each; to ascertain to what extent, among what classes, and under what conditions zymotic diseases have been fatal during the last twelve months; to consider the cost of such diseases to the community; to report upon all those matters, and generally upon the sanitary state of the borough and the means of improving it, but especially upon the advisability and practicability, under the direction of the Corporation, of opening up new streets in crowded districts, of sweeping away old, dilapidated, and unhealthy dwellings, and of erecting in their stead better and healthier houses, and lodging houses for the labouring classes; such sub-committee to consist of Alderman Wilson, Councillors Plummer, Mawson, and Sanderson, Rev. J. H. Rutherford, Messrs. Charlton and Pace, and Drs. Embleton, Humble, Murray, and Hardcastle.

REPORT.

TO THE PUBLIC HEALTH COMMITTEE.

THE total number of deaths in the borough of Newcastle-upon-Tyne, during the year 1866, was 3950, in an estimated population of 122,277, being an average of 32.12 per thousand. Death-rate of Newcastle,

The death-rate of the large towns per 1,000 in the year 1866, has been reported by the Registrar-General, whose figures are as under:—

Liverpool	...	...	...	...	41.85	compared with that of other large towns;
Leeds...	...	...	...	...	32.54	
Newcastle	...	...	...	...	32.12	
Manchester	...	...	...	...	31.95	
Glasgow	...	...	...	...	29.58	
Salford	...	...	...	...	29.04	
Dublin	..	...	...	...	28.47	
Sheffield	...	...	...	...	28.14	
Edinburgh	...	...	...	...	27.37	
London	...	...	...	...	26.47	
Bristol	...	...	...	...	24.91	
Hull ...	...	...	...	...	24.45	
Birmingham	...	...	...	...	24.08	

The average death rate of the thirteen towns was 28.60. Liverpool, Leeds, Newcastle, Manchester, Glasgow, and Salford, were above the average; and Dublin, Sheffield, Edinburgh, London, Bristol, Hull, and Birmingham, below.

Newcastle was 3.52 per thousand, or 429 deaths above the average of the thirteen towns, and 8.04 per thousand, or 980 deaths, above that of Birmingham. The life-time of a generation, according to the death-rate of the past year, was in London about 37 years, in Bristol 40, in Hull 40½, and in Birmingham 41, while in Newcastle it was little more than 31 years. The mean annual mortality per thousand, in the chief towns of the kingdom, during the ten years 1854-1864, was 24.25; and in the small towns and country parishes during the same period, 19.73. The Newcastle death-rate during the past year was thus 7.87, or 960 deaths, above the former, and 12.39, or 1,511 deaths, above the latter.

In statistical tables, Rothbury, Bellingham, and Glendale are model districts. Taking the last for comparison, where

compared with
that of small
towns,

and

country dis-
tricts.

in ten years, the average mortality was only 15 deaths to 1000 living, the Newcastle death-rate for 1866, was 17.1 in excess; or, in other words, 2,080 persons died during the past year, who, according to the Glendale standard, should have lived.

Highest mortality in December quarter.

The highest death-rate in the borough, for the year 1866, prevailed during the last quarter. For the first three months it was 31.6, for the second 28.6, for the third 31.6, and for the last 36.7. The rate of mortality in each of the ten large towns during last quarter, ranged in order from the lowest, were as follows:—Bristol 21.2, Birmingham 21.7, Hull 23.0, London 24.1, Sheffield 24.4, Salford 26.2, Leeds 28.4, Manchester 29.6, Liverpool 33.1, Newcastle, standing at the bottom of the list, having during that quarter a higher death-rate than Liverpool by 3.6 per thousand of persons living.

Table, showing the births, deaths, mean temperature, and rainfall in Newcastle-on-Tyne for each of the quarters of 1866.

Comparison of each of the quarters of 1866.

Year 1866.			Annual Rate to 1000 living.		Mean Temp.	Rain-fall, in.
	Births.	Deaths.	Births.	Deaths.		
1st quarter, Mar. 31	1,299	962	42.64	31.58	38.9	3.5
2nd do. Jun. 30.	1,281	872	42.05	28.62	50.4	4.6
3rd do. Sep. 30.	1,184	962	38.8	31.58	55.1	9.4
4th do. Dec. 31.	1,104	1,118	36.24	36.70	44.2	4.7
	4,868	3,934	39.93	32.12		

From the above table it appears that during the quarter ending the 31st December, 1866, the deaths were 1118, and the births 1104; the deaths thus being in excess of the births by 14.

Comparison with former years.

The death-rate of the borough during the past year was considerably in excess of former years. The average for the ten years, 1851 to 1860, was 27.4 per thousand, being less by 4.9 in the thousand than in 1866. In the year just ended, an increase in mortality has taken place in each of the registration sub-districts in Newcastle, as compared with previous years.

AVERAGE FOR	Westgate and Workhouse	St. Andrew's	St. Nicholas'	All Saints'	Byker	Total per 1000
1866.....	29.8	27.2	39.7	35.2	29.4	32.3
1851 to 60	25.7	23.5	35.4	28.3	25.2	27.4
Excess...	4.1	3.7	4.3	6.9	4.2	4.9

The increase, it will be observed, has been the greatest in the parish of All Saints', being 6.9 above the average of the ten

years from 1851 to 1860. The following are the quarterly returns of the parish of All Saints' for the past year:—

1st quarter	...	...	33.5	per 1000.
2nd quarter	...	...	28.6	" "
3rd quarter	...	...	35.5	" "
4th quarter	...	...	43.2	" "

To ascertain the correct death-rates of the five registration districts of the borough, it is necessary to correct those of the Westgate and St. Nicholas' sub-districts, by omitting the deaths in the public institutions situated in those districts. Of the 1118 deaths returned last quarter in Newcastle, 77, or rather less than seven per cent., occurred in these institutions; of these 25 occurred in the Workhouse, situated in the municipal portion of Westgate sub-district; 30 in the Infirmary, 18 in the Fever Hospital, and 4 in the Vagrant Ward, all in the sub-district of St. Nicholas. Corrected by the exclusion of these, the five registration sub-districts of the borough for the last quarter, stand relatively as follows:—

Death-rate corrected for last quarter of 1866.

Westgate (corrected)	...	29.8	per thousand.
St. Nicholas' (corrected)	...	30.9	"
St. Andrew's	...	32.7	"
Byker	...	32.7	"
All Saints'	...	43.2	"

Between the West end and East end of the town there was thus a difference during the last quarter of 1866, of no less than 13.4 per thousand in favour of the West. If Elswick were separated from Westgate, the difference would appear still more marked.

Comparison between East and West

The extent to which public institutions are a disturbing element in calculations of the death rate in the borough, is indicated by the fact, that, while during the past year, 3950 deaths occurred in the town, only 62 persons belonging to the neighbouring counties died in the Infirmary. Moreover, the other large towns contain similar institutions, and London has so many of them, that they contributed 13,054 deaths, or nearly a sixth to its entire mortality for 1866.

Deaths in public institutions for the year 1866.

The total number of deaths in the Infirmary during the year was 121; in the Fever Hospital 77; and in the Workhouse 154. To make an accurate comparison of the registration sub-districts, it is necessary to deduct the deaths in each of these public institutions from the returns of the sub-district in which it is situated, and to distribute them according to the localities whence the cases came. The result is seen in the following

Death-rate corrected for 1866.

Table, showing the rate of mortality (corrected) in each of the registration sub-districts of Newcastle-upon-Tyne, during the year 1866.

Distribution of deaths in public institutions to districts whence they came.	Deaths in 1866, (Return'd)	Deaths in 1866, (Distrib.)	Estimated Population.	Death-rate per 1000 living.	Death-rate per 1000 living (Correct.)
All Saints	1002	1100	28,717	35.2	38.30
Byker	394	429	13,385	29.4	32.04
St. Nicholas and } St. John	680	521	16,731	39.7	31.14
St. Andrew	486	520	17,717	27.2	29.34
Westgate & Elswick	1388	1310	45,527	29.8	28.77
Non-resident	...	70			
Totals ...	3950	3950	122,077	32.12	31.91

From the above table it appears that of the five registration sub-districts of the borough, during the past year, All Saints has been the least healthy, and Westgate and Elswick the most healthy.

Average death-rate of Newcastle above average of large towns.

The mean annual rate of mortality in the chief towns of the Kingdom during the ten years, from 1854 to 1863, was 24.25 per thousand; whilst that of Newcastle for the same period, was 27.4 per thousand. It will thus be seen that in Newcastle, as a rule, an abnormally high death rate exists.

DENSITY OF POPULATION TO BUILT AREA.

Overcrowding on built area.

Some explanation of the above fact will be found in the relation of the density of the population to the built area of the town. Our forefathers, unfortunately for the present generation, more concerned to defend themselves against border forays, than against disease, appear to have had a predilection for narrow streets; and the high price of land in modern times, has led to an unwise economy of space. It has been ascertained that great density of population, and a high rate of mortality generally, if not invariably, co-exist.* This is abundantly proved in the case of Newcastle. In St. Nicholas' there are 162 persons per acre, All Saints' 112, St. John's 107, Westgate 86, Elswick 18, St. Andrew's 11. In the case of Elswick, but more especially of St. Andrew's, the population is lodged on a small part of the area of a wide district, and thus the density of the part on which the people dwell is not accurately expressed by the acreage. The data for the comparison of the built areas of our large towns are not

* Appendix, I.

to be had, but the population to the gross acreage is as follows.—

London	...	...	39 persons per acre.
Bristol	...	...	34 " "
Birmingham...	...	...	42 " "
Hull...	...	...	29 " "
Sheffield	...	...	96 " "
Edinburgh	...	...	39 " "
Dublin	...	...	32 " "
Manchester	...	...	80 " "
Glasgow	...	...	85 " "
Liverpool	...	...	94 " "

Population to
gross acreage
of large towns.

Newcastle has only 23 persons an acre, but a glance at a map of the town shows how very small is the built area of the borough compared with the open spaces around, included in the borough boundaries. St. Nicholas', with its 162 persons to an acre, and All Saints', with its 112, derive but small benefit from the unbuilt spaces in Elswick, and from the great acreage of the Town Moor and Castle Leazes.

The influence of the area density of population on the death rate will be seen in the following—

Table, showing the population per acre, the death rate for 1866, the zymotic death rate, and the average life-time in each Registrar's Sub-District of Newcastle, 1866.

The influence of
area density of
population
upon death-
rate.

DISTRICT.	Popula- tion per Acre.	Death Rate per 1000 in 1866.	Zymotic Death Rate per 1000 for 1866.	Average life time .
St. Nicholas' and St. John's	126	39.7	10.23	25 yrs.
All Saints'.....	112	35.2	12.19	28 „
Westgate and Elswick	44	29.8	8.10	33 „
Byker.....	15	29.4	8.42	33 „
St. Andrew's.....	11	27.2	7.68	36 „

The rates of St. Nicholas' and Westgate Registration Sub-Districts require correction for the public institutions situated within their bounds, but a comparison may fairly be made of the other districts, which are not exposed to such disturbing influences. The population of St. Andrew's, although in some parts much crowded on its built area, enjoys a purer air than the population of All Saints', where there are few open spaces, and where the value of life during 1866 was eight years less. On the Town Moor the rain is alkaline in its reaction; while in Pandon, the amount of acidity is such as at once to redden blue litmus-paper. In this very simple way, as Dr. Angus Smith has pointed out, we obtain a distinct idea of the extent to which the air is deteriorated by coal smoke.

Comparison
between St.
Andrew's and
All Saints'.

Aggravated by
narrow streets,
and want of
open spaces.

The surface overcrowding is greatly aggravated by narrow streets and want of open spaces. The consequence is atmospheric impurity, which though it may not always reveal itself to the sense of smell, nevertheless silently saps the vital powers of those who are constantly exposed to its influence. Possibly some constitutions may be proof against it, but large numbers suffer and pine away. It almost seems as if many of the past building arrangements had been intended to keep out light and air; for there are numerous back streets which can only be entered by tunnel-like archways.

WANT OF SURFACE DRAINAGE.

y sub-soil.

The value of sub-
soil drainage.

Newcastle well
situated for
subsoil
drainage.

The density of population relatively to the built area of the town, the narrowness of the streets, and the want of open spaces in the immediate neighbourhood of the dwellings of the poor, are sanitary evils of ancient date; and though tending to produce an abnormally high death-rate, cannot be regarded as the only determining causes of the excessive mortality of the past year. Neither can that excessive mortality be attributed to the nature of the subsoil upon which Newcastle stands. That subsoil is clayey, cold, and unfavourable to health, but not more so now than a century ago. When the foundations of our large towns were laid, the value of subsoil drainage to everything living upon land was not understood, and even now, sufficient importance is not attached to it. The fact that a subsoil of sand or gravel is more favourable to human life than a damp and clayey subsoil, has not stimulated those whose habitations must be built on clay, by artificial means, to obtain the advantages of those who build upon sand. The scientific agriculturist knows how easy it is by proper drainage to improve the temperature and increase the produce of his fields; the furrows that were bleached and bare become covered with verdure. But those who build human dwellings, have too often been content if their walls were dry, and, indeed, have not always secured that. The entire area upon which a town stands should be as carefully and scientifically drained, as if the object were to raise the largest possible crop of corn; children are not likely to thrive where cereals could not have flourished. It may be difficult to remedy the past; but every plot of land laid out in building sites, should be effectually drained, and not a house built until this is done. Sewers, however well-constructed, will not in themselves effect this object. They are too wide apart; but they may serve as the chief veins for a capillary net-work of subsoil drainage. For the carrying out of such a system, few towns are more admirably situated than Newcastle. Built upon ridges, which naturally slope downwards to the river, its denes, or the main sewers which now occupy them, should form the trunks of such a system, the perfecting of which would tend to improve our climate, and lower our

high average mortality. While the want of subsoil drainage is most likely to be felt, and to be most prejudicial in years of greatest rainfall and most variable temperature, a glance at the tables of temperature and rainfall for the last few years, will show that we must look elsewhere for the principal determining cause of the very high mortality of 1866.

MORAL, SOCIAL, AND ECONOMICAL INFLUENCES.

Among the permanent causes of the high death-rate in our large towns, those of a moral, social, and economical kind undoubtedly take a high rank; but there is no evidence that in these respects Newcastle is worse than the other large towns of the kingdom, or worse in 1866 than in previous years. As in other seaports and manufacturing towns, there is a constant gravitation of unskilled labour towards this centre of commercial industry; probably not so great, in proportion to the population, as in the case of Liverpool and Glasgow, or the East of London, but still sufficiently large to make that valuable and important portion of the community feel the first effects of any stagnation of trade, or economical convulsion. An unskilled labourer, attracted from agricultural employment, by the prospect of better wages in the town, must find it difficult, upon his average wage, to maintain his wife and family, and to provide them with a comfortable and airy dwelling. And if, in addition to this difficulty, he has to face uncertainty of employment, and an irregular rate of wages, he may become the victim of improvidence, and of the many other evils which improvidence is apt to engender. Intemperance is, doubtless, one of the most prolific causes of a high death-rate; not so much by its direct effects, as because it intensifies other causes. Nothing is so productive of parental neglect, or of wretched homes and filthy habits. It breaks the backbone of a man's independence, and renders him insensible to all the influences that would elevate his nature. Yet it must not be forgotten that an impure atmosphere, whether in the workshop or at home, makes a man a more ready prey to the many temptations which surround his path. However much physical wretchedness, in the homes of the people, is attributable to intemperance, there is no reason to suppose that there was any such sudden increase of it, during the past year, as to account for the excessive mortality.

Unskilled labour attracted to large towns.

Uncertainty of employment likely to produce improvidence and intemperance.

EXTERNAL ATMOSPHERIC POLLUTION.

Among the ordinary unfavourable hygienic conditions, common to Newcastle with other large towns, a prominent place must be assigned to the vitiation of the atmosphere by festering substances, decomposing offal, noisome exhalations of manufactories of animal matters, stenches of sewers and drains, and over all the black outpourings of innumerable

Deleterious influence of impure atmosphere upon health.

The town
diathesis.

t of ozone.

Organic impuri-
ties in air and
a high death-
rate.

Evil of inhaling
air laden with
carbonaceous
particles.

chimneys. These evils, if they do not actually produce disease, so vitiate the blood, and exalt the susceptibility of the system to deleterious influences, so lower the tone and strength of the population, that an abiding tendency, which almost amounts to a diathesis, exists to take on diseased action, whether in the shape of typhus, scarlatina, measles, diarrhoea, or cholera. The nearly constant acidity of the rainfall in the more central parts of the town, as already stated, is a strong proof of chemical impurity. After numerous and careful experiments, not the slightest trace of ozone has been detected in the centre of Newcastle. The precise importance of this fact it may be difficult to determine, because little is known of the effects of ozone upon the human body, but the preponderance of testimony is that these effects are tonic and invigorating. In the Western Islands of Scotland, where the quantity of ozone is the highest recorded, the health of the people is peculiarly good. In the absence of ozone from our atmosphere, we have at least evidence of an important change; and probably of the existence of organic, as well as other impurities. In reference to such organic impurities diffused through the air, Dr. Angus Smith remarks that, "we have in different air breathed by people in the same country, a substance the amount of which in one case is 22 times greater than in the other; and in air breathed by people in the same town, a difference which is as 9 to 22;" and further, "that in the district in which the highest numbers were obtained, there were, in 1855, 45 deaths in the 1000, while the average is 22." It is well known what hard times plants have in the centre of the town, how soon their leaves get coated with soot, and, as the result of the imperfect respiration thus induced how rapidly they fade, unless constantly washed. The continual contamination of the air of the people must exert a debilitating influence upon their health, and we should not wonder that after death we find a large quantity of black matter in the lungs and bronchial glands of persons who have seldom inhaled other air than that which is laden with carbonaceous particles. The impurity of our atmosphere may partly account for the large amount of bronchial and phthisical disease, always prevalent in this large town.

UNPAVED AND UNSEWERED STREETS.

There is no other large town in the kingdom where there are so many unpaved, unflagged, and unsewered streets as in Newcastle, and this must be regarded as one of the circumstances favourable to a permanently high death-rate. The proper scavenging and cleansing of such streets is utterly out of the question, and is, indeed, never attempted. The consequence is the gradual accumulation of filth, which is stirred by every shower, and from which every warm day

draws forth poisonous exhalations. With "a mud-ocean" outside, we must not be surprised at want of cleanliness inside, the dwellings of the people. And when, under the influence of long-continued drought, that mud-ocean dries up, the dust of such streets, where no water-cart ever comes, is a source of as great injury to the health of their inhabitants, as it is of discomfort. On the 7th of November, 1862, the Town Improvement Committee reported to the Council, that, at that date, upwards of 200 streets remained unpaved; 13 of those streets were built on both sides, and completed previous to 1832, or more than thirty years ago; 29 of them were so old that the date cannot be traced when the houses were built and the streets completed, but they still continued unpaved and unsewered; 19 more of them were completed between 1832 and 1847, and 139 between 1847 and 1862. They also found that streets were still unpaved, for which orders of Council for their formation were taken, so far back as 1852, or fully ten years before. The Town Improvement Committee further reported that the numbers of streets then remaining unpaved, and for which orders of Council have been taken, and also those for which orders had not been taken, were as follows:—

	With Orders.	Estimated Cost.	Without Orders.	Estimated Cost.
In the Old Borough	35	£7,511 18 9	20	£4,348 10 2
Byker Township ...	5	837 10 0	4	595 10 0
Westgate Township	61	14,906 5 0	5	1,087 0 0
Elswick Township	62	33,010 17 10	13	4,869 15 7
Ditto, Handyside's Property	14	4,255 19 11	0	
With Orders	177	60,522 11 6	42	£10,900 15 9
Without Orders	42	10,900 15 9	—	—
Total	219	£71,423 7 3		

Included in the above, were 18 streets, upon which £5,400 had been expended up to 31st of August, 1862; thus leaving 201 unpaved streets, with which to commence the year 1863. From 1854 to 1862, inclusive, a period of nine years, only 79 streets were completed, giving an average of scarcely nine streets per annum. At that rate it would take fully 22 years to overtake the arrears, without taking into consideration the number of new streets required by a rapidly increasing population. It is difficult to understand the reason of this delay in a matter of such vital importance to the health and comfort of the people's homes. It certainly could not be a question of economy, for in the same report, the Town Improvement Committee state, that, without taking into account the sum of £580 allowed for old materials and other claims, the total actual loss to the Corporation, upon an expenditure of £24,000, over a period of twelve years, in the formation of 85 new streets, would only be about £60,

Danger to public health, arising from filthy streets.

219 of unpaved streets in the Borough in 1862.

18 streets paved during 1862.

Cost to the Corporation.

The whole 201 streets in arrears might have been paved at a total cost to the Corporation of not more than £180.

Resolution of the Town Improvement Committee, that no street should be paved till greater part of cost be paid by owners,

£5,305 spent in 1863 upon the renovation of old streets.

New powers from Act of 1865.

or very little more than 5 shillings per cent., or £5 per annum. At this ratio, the whole 201 streets in arrears, might have been paved, at a total loss to the Corporation of not more than £180, or less than the average annual amount expended upon the barge day. Notwithstanding these facts, during 1863, only 12 new streets were entirely paved, a considerable number of them being back streets; a principal part of the paving operations for that year being devoted to the renovation and improvement of the old streets. The Town Surveyor reports that, in preparation for the meeting of the British Association, held in August, 1863, "several old and dilapidated properties that stood at the head of the New Town Hall Buildings, at St. John's Lane, and at the Bank Side, were pulled down, in order to give additional accommodation to the thoroughfares. The pavements in several of the old streets were entirely taken up, and re-laid with new square sets, which afforded great additional width of footpaths, and considerably improved gradients in the carriageway." "It is to this cause," he adds, "that the increase of expenditure in my department must be attributed; for the resolution of the Committee, that no new street should be taken in hand, to level, pave, and flag, without the whole, or at least a considerable part, of the cost being previously subscribed by the parties concerned, has imposed a decided check upon progress in this department of public works." Had the Committee understood that to leave 200 streets unpaved was to sacrifice many lives, it is inconceivable that, under all the circumstances, such a resolution could have been passed; especially when they spent upon paving during the 12 months ending 31st of August, 1863, no less a sum than £7126 8s. 1d., only £1820 9s. 8d. of which was recoverable from owners of property, the remainder £5305 18s. 5d. being the amount spent upon the renovation of old streets, some of which might, without injury either to trade or health, have served a few years longer. In 1864, the new street operations, regulated by the advance of a portion of the estimated amount by the proprietors, were still of the most limited character; only 12 new streets being completed during the year. Of these 4 were situated in the Old Borough, 5 in Westgate Township, and 3 in Elswick; the most important of them being that portion of Hinde Street or Scotswood Road, extending from Ord Street to the foot of Gloucester Street. In 1865, the New Town Improvement Act passed, empowering the Council to raise from owners, in advance, the money required for the paving, flagging, and sewerage of new streets. Since the passing of that Act, only 10 streets have been completed, and 35 partly completed. All that has been done since 1863, has barely kept pace with the number of new streets constantly laid out, and last year found us with not fewer than 200 streets still unpaved. In Westgate

and Elswick, we find 155 of these streets; and although, during the past year, upon the whole, the healthiest sub-district in the borough, it was by far the least healthy as regards diarrhoea, a disease largely dependent upon heat, and the poisonous emanations from decaying animal and vegetable substances. Out of 123 deaths from diarrhoea, registered in the borough last year, 68 took place in the sub-district of Westgate and Elswick, being 149 deaths to 100,000 persons living, as compared with 90 in All Saints, 73 in St. Andrew, 67 in Byker, and 41 in St. Nicholas and St. John. The mean annual mortality in England from diarrhoea, for fifteen years, is 80 in 100,000 persons living; the deaths from this cause in Westgate and Elswick, thus being 69 in excess. Diarrhoea, among the principal causes of death in Newcastle, during 1866, takes the eleventh place, accounting for 31 per thousand of the deaths from all causes; while in the sub-district of Westgate and Elswick, it takes the seventh place, and accounts for 49 per thousand of all the deaths. At the ratio of 1866, the deaths from diarrhoea in Westgate and Elswick, during the past ten years, would be 300 in excess of the number computed according to the mean annual mortality in England from that cause. It is impossible to resist the conviction that this great excess has arisen from the wretched and filthy condition of the miles of unpaved streets which are to be found in this sub-district; indeed, a map of disease would show that it is in these streets that diarrhoea has most prevailed.

Most of the unpaved streets found in Westgate and Elswick.

And excessive mortality from diarrhoea.

SEWERAGE.

The sewerage of the town, although still far from complete, is so greatly improved as compared with what it was a few years ago, that it cannot be regarded as the cause of the excessive mortality of last year. Since 1857, upwards of 16 miles of new sewers have been constructed within the borough, the total length reported, up to 1864, being 64,393 yards, or 36 miles and 1,033 yards. Under the direction of the Town Improvement Committee, every year has shown a commendable amount of progress in this department of the Town Surveyor's work, and the last, not the least. Still, the experience of other large towns has shown that without thorough ventilation, or efficient flushing, an elaborate system of sewers may become the entrenched camp of an enemy to public health, none the less formidable, that it is underground and hidden from the eye. The best and most economical means of cleansing sewers of their noxious gases, or, still better, of removing the decomposing organic matter which gives rise to those gases, is a problem not yet fully solved; yet it cannot be doubted that the more efficient surface drainage of the Town Moor, Castle Leazes, and other open spaces and fields, still left in some parts of the borough,

Length of sewer completed since 1857.

Need of ventilation and flushing.

would, by being properly connected with the system of sewers, tend greatly to improve their condition and atmosphere.

WATER SUPPLY.

Water supply abundant but sometimes impure.

A special committee of the Council has reported an improvement both in the quantity and quality of the water supplied by the Whittle Dean Water Company, as compared with previous years; and possibly, to its greater freedom from organic matter, may in some measure be attributed our comparative exemption from cholera during the past year. Still, there is sufficient evidence to show that in some parts of the town, at certain times, the water supply, though in general abundant, was visibly and very impure. This may have arisen from only temporary causes; and it is to be hoped that the Water Company, upon whom, with regard to the public health, so great a responsibility rests, will find the means of constantly furnishing all parts of the borough with water as pure, if not as soft, as that with which the city of Manchester is supplied.

OVERCROWDING.

Overcrowding the great predisposing cause of the excessive mortality of 1866.

The vitiation of the atmosphere of dwellings, by overcrowding, is one of the most powerful causes of a permanently high death-rate; and a considerable increase of overcrowding seems to have been the great predisposing cause of the excessive mortality of the borough, during the past year.

Table, showing the number of inhabited houses, with the population, of the chief towns in the Kingdom in 1851, and 1861; the average number of persons to a house in 1861, with the annual rate of mortality to 1000 persons living during the 10 years 1850-60, and also during the year 1866.

	1851.		1861.		No. of persons to a house in 1861.	Av. rate of mortality to 1000 persons living during the 10 years 1850-1861.	Death-rate per 1000 in 1866.
	Inhabit. Houses.	Population.	Inhabit. Houses.	Population.			
London.	305,933	2,362,236	359,421	2,803,989	7.7	23.6	26.47
Liverpl..	54,310	375,955	65,781	443,938	6.7	30.0	41.85
Manchr.	53,204	316,213	65,375	357,979	5.5	29.4	31.95
Birming.	45,844	232,841	59,060	296,076	5.0	24.9	24.08
Leeds....	36,165	172,270	44,657	207,165	4.6	26.3	32.54
Bristol. .	20,873	137,328	23,590	154,093	6.1		24.91
Hull ...	16,634	84,690	19,516	97,661	5.0		24.45
Sheffield	27,099	135,310	38,052	185,172	4.8		28.14
Newcast.	10,441	87,184	13,979	109,108	7.8	27.4	32.12
Salford ..			19,128	102,449	5.3	26.2	29.04

The preceding table shows that Newcastle had, at the last census a larger number of persons to each inhabited house than any of the other large towns in England.

DIMINISHED HOUSE ACCOMMODATION.

The provision of house accommodation in the borough has not kept pace with the growth of population, there has thus resulted a large amount of overcrowding in the dwellings of the people. In 1861 there were in the borough 13,979 inhabited houses, 588 uninhabited, and 330 building—the population was 109,108 persons, or rather less than eight persons to each inhabited house. The population is now estimated at 122,277, being an increase of 13,169. Not quite 1,300 houses have been built since 1861, a large number of which are of the class adapted and intended for one family only, others for not more than two families, while very few have been specially designed as tenements of one or two rooms for the poorest of the population. Through the operation of building societies many artizans have become their own landlords, but no similar provision has been made for our labouring population.

Various circumstances—differences between masters and workmen amongst others—have combined to limit building operations in the town during the last few years, a fact strikingly illustrated by the following figures. The number of houses built or being built in 1862 was 387; in 1863, 220; in 1864, 187; and in 1865 only 108. This marked diminution in house accommodation for the rapidly increasing population has been followed by a rise in rent, a great increase in the overcrowding of tenements, and by a death-rate only exceeded during cholera epidemics. While building operations had almost ceased, the removal of property, occupied by the labouring population, for purposes of improvement has during the past few years proceeded with more than usual rapidity. Several hundreds of families have been thereby displaced and left to find accommodation for themselves, which they could only do in already overcrowded dwellings.* Under these circumstances, the closing of places unfit for human habitation would only aggravate the evil. The first step in compulsory closing is to secure better dwellings to which the people may betake themselves. The Corporation may be fairly held responsible to provide for those who are displaced by town improvements, or at least to make sure that they are provided for.

At the last census there were 469 inhabited houses in the parish of St. Nicholas, occupied by 7,487 persons, being 15 persons to each house, some of the houses being of three and four stories. Almost the whole area has been built upon, only 3 houses having been built since 1861. St. John's,

Lull in
housebuilding

Tenements
pulled down
for public
improvement

Inhabited houses
and popula-
tion in St.
Nicholas and
St. John.

* Appendix, II.

with its 989 inhabited houses, occupied by 9,145 persons, or upwards of 9 persons to each house, is in very much the same position, 9 houses having been built since the census; the only difference being that the houses are not huddled quite so closely together as in St. Nicholas', or that the wretched old property is more intersected by wide and good streets, a result largely due in this, as in other parishes, to the genius and energy of the late Richard Grainger. The property consists chiefly of shops, offices, and houses let in tenements. The shops and offices are almost deserted at night, leaving a large portion of the population to be divided among the tenements.

All Saints.

All Saints, with a population at the census of 26,765, contained 3,178 houses, being an average of 8·4 persons to a house. There were over 13 houses then in course of construction, and 145 have since been built, or are in process of being built. Here, as in St. Nicholas' and St. John, there are many offices and shops, a still greater amount of tenemented property, with a very considerable number of self-contained houses, occupied by only one family, chiefly of the artizan class. The registrar of the sub-district states, and his statement is verified by the returns, that the excessive mortality which he has recorded during the past year is not found in those self-contained dwellings, but in the tenement property, where also there is the greatest amount of overcrowding. It is in the parish of All Saints' too, that the greatest number of persons have been expelled from their houses, to make way for recent improvements, such as the construction of the railway to the quayside.

Byker.

Byker, with a population at the census of 1817, had 12,994 inhabited houses with 4 building, or an average of 7·6 persons to a house. Since that time, the estimated increase of population, according to the Registrar General's return, is 391, with an increase of 54 houses.

St. Andrews.

In 1861, the district of St. Andrew contained 2,400 inhabited houses, 109 uninhabited, and 12 building, with a population of 17,100, or about 7 persons to a house. The property is of the most mixed description, a very large proportion consisting of first class houses, shops, and offices, with a portion of self-contained dwellings, and a considerable sprinkling of tenemented property situated mostly in old narrow alleys and courts. The estimated increase is 617, for whom rather above 100 houses have been provided.

Westgate and
Elswick.

In 1861 Westgate and Elswick had a population of 37,477, living in 5377 houses, being an average of rather less than 7 to a house. The estimated increase of population has been 7040, and the number of houses built 932.

In Elswick, there has been the greatest increase in house accommodation, 657, or more than one-half of all the houses that have been built since 1861, being situated in that parish.

At the census, Elswick contained 2,227 inhabited houses, occupied by 14,345 persons; but while there has been no pause in the growth of population, there has been a most marked lull in house building. The number of houses built, which in 1862 was 257, fell to 131 in 1863, to 76 in 1864, and to 62 in 1865. Here, as in other parts of the borough, the great demand for houses gave a fresh impulse to building during the past year, but the supply is still far from meeting the wants of the community.

Falling off in house building in Elswick since 1862.

Table, showing the number of inhabited houses, population, and average number of persons to a house in each of the Registration Sub-districts of Newcastle-on-Tyne; with the general and zymotic death-rate per thousand in 1866.

The pernicious effects of overcrowding seen in the zymotic death-rate.

Sub-District.	1851.			1861.			1866.					
	Inhabited Houses.	Population.	Average number of persons to a House.	Inhabited Houses.	Population.	Average number of persons to a House.	New Houses built from 1861 to 1866.	Total Inhabited Houses.	Estimated population.	Average number to a House.	Death-rate per 1,000 in 1866.	Zymotic death-rate per 1,000 in 1866.
Westgate	2,574	21,338	8.3	5,377	37,477	6.9	932	6,309	45,527	7.2	30.5	8.1
St. Andrew	2,052	15,643	7.6	2,400	17,100	7.1	138	2,538	17,717	7.0	27.4	7.6
St. Nicholas & St. John	1,563	16,444	10.0	1,571	16,632	10.0	11	1,582	16,731	10.0	40.7	10.2
Byker -	2,071	12,280	5.9	1,817	12,994	7.1	54	1,871	13,386	7.1	29.6	8.4
All Saints -	2,425	23,401	9.6	3,178	26,765	8.4	116	3,294	28,717	8.7	34.9	12.1
Totals	10,685	89,156	8.3	14,343	110,968	7.7	1,251	15,594	122,077	7.8	32.3	9.32

The Infirmary and Fever Hospital, situated in St. Nicholas, obscure the averages for that sub-district, but in All Saints with really the largest number of persons to a house there is the highest general and zymotic death-rate.

Between 1851 and 1861, there was an increase of 21,812, in the population of Newcastle-on-Tyne, and of 3,658 in the number of inhabited houses, being a house for every six persons added to the population. During that period the people of England increased 2,138,615, and the number of inhabited houses, 461,466, or a house for every 4.6 of those added. Since 1861, the augmented accommodation for the estimated increase of population in Newcastle has scarcely averaged a new house for every ten persons. The great accumulation of wealth, during the last fifteen years, has led to a considerable increase and improvement in the house accommodation of the middle classes, and of merchants and artisans, but no similar progress has been made in providing better dwellings for the labouring poor. Private enterprise has done much to meet the necessities of well-to-do people but scarcely anything for unskilled labourers, who form so large and important a part of our population. The tall, old

No special provision made for persons wanting one or two rooms.

Old houses let in single rooms without adaptation to new uses.

houses in narrow, ill-ventilated streets, once occupied by the gentry and tradespeople, but long since vacated by them for suburban residences, are let, by their owners, in tenements, at considerable rents, to labouring people, generally without any proper adaptation for the new uses to which they are put. One or two rooms, with suitable conveniences for a family, are scarcely anywhere to be found; nor, judging from the past, is the want likely to be supplied by private capitalists.

EXCESSIVE OVERCROWDING IN TENEMENTS.

Influence of overcrowding in tenements seen in the death-rate from typhus.

Resulting from the marked deficiency in house accommodation referred to, there is an excessive overcrowding in houses let in tenements throughout the whole borough; and if this is the determining cause of the high death rate in each of the registration sub-districts, it might be expected that it would be highest in those districts where tenements are found in greatest abundance; and such is the fact.

Table, shewing the number of occupiers of tenements in the Borough of Newcastle-upon-Tyne; the per centage of such tenements to total population; and the general and zymotic death-rate (corrected) per thousand persons in each of the Registration Sub-Districts, during 1866.

The greater the number of small tenements in any sub-district, the higher the death-rate from all causes, from zymotic diseases, and from typhus.

Sub-district.	1. Occupiers of One Room.	2. Occupiers of Two Rooms.	3. Total of both.	4. Estimated Number of Persons.	5. Per Cent. of Population at Census.	6. Death-rate per thousand in 1866 (corrected).	7. Zymotic death-rate per thousand in 1866.	8. Deaths from Typhus in 1866.	9. Typhus death-rate $\frac{1}{1000}$ of entire population.
All Saints	3400	1856	5256	15,768	53.	38.30	12.19	116	4.0
St. Nicholas } & St. John }	1245	1010	2255	6,765	40.	32.04	10.23	24	1.4
Byker.....	1690	100	1790	5,370	41.	31.14	8.42	36	2.7
Westgate & } Elswick ... }	1411	2898	4309	12,927	34.	28.77	8.10	34	0.7
St. Andrew ...	1893	327	2220	6,660	38.	29.34	7.68	14	0.8
Total for the } Borough... }	9639	6191	15,830	47,490	43.	31.91	9.32	224	1.9

Ratio of occupiers of tenements to death-rate from typhus.

The eighth column of the above table shows the true mortality from typhus in each of the sub-districts during 1866; the deaths in the Fever Hospital being distributed, according to the places from which the patient came. Typhus is an almost infallible indicator of overcrowding; and it will be

seen that the death-rate from that disease is highest where the compound householders are most numerous. In Westgate, where 34 per cent. of the population live in tenements, 7 in 10,000 died of typhus in 1866. In St. Andrew, the deaths from typhus were 8 in 10,000; while the population living in tenements was 38 per cent. of the whole. In the sub-district of St. Nicholas and St. John, where 40 per cent. are compound householders, the deaths from typhus were 14 per 10,000. Byker has 41 per cent. of its population occupiers of tenements, and its typhus death-rate was 27 per 10,000. While All Saints, with 58 per cent. of its population occupying tenements, and nearly two-thirds of them living in single rooms, had during last year 40 deaths from typhus to 10,000 persons living.

Your sub-committee having before them the fact that 43 per cent. of the entire population live in small tenements, are unable to express surprise at the melancholy results indicated by the Registrar's returns. There are, or were, very recently in the town, 9639 families occupying single rooms, and 6191 families occupying two rooms, or a total of 15,830 families who have to live, eat, toil, sleep, and perform all the offices of life under these conditions. Amid such crowding it may seem a small matter that one should be added here and another there; but then it must be remembered that it has been ascertained with scientific accuracy, that the diminution of the oxygen in a room by a very few thousands in the million, or the increase of carbonic acid by a few hundreds of grains in the million, will depress the vitality of the strongest man.* We must not therefore wonder that the diminution or abundance of these gases will, in the case of thousands of infants, determine whether they shall live or die, and whether a zymotic matter like typhine or scarlatine, shall spread throughout a whole town, or be confined within a limited area; nor need we be surprised that disease should be most rife and fatal among the dwellings of the poor.

As we have seen, the death-rate has been highest in All Saints'; and in this parish fully one half of the entire population live in tenements; in Byker a half, in St. Nicholas' nearly a half, in St. John's more than a third, in St. Andrew's more than a third, in Westgate more than a third, and in Elswick less than a third. The ratio of tenement property to other house property in any parish or township, is, other things being equal, and so long as overcrowding continues, a true index of the death rate in that parish or township.

Whether we consider the town as a whole, or take its parishes and townships in detail, we find that at the commencement of 1866, there was less house-room in proportion to the number of inhabitants, than there had been since 1861, if not for many years before; that for purposes of town improve-

In the Westgate and Elswick sub-district where there are fewest tenements there have been the fewest deaths from typhus.

Number of occupiers of one and two rooms in the Borough.

Air vitiated by overcrowding depresses vitality.

Ratio of tenement to other property a true index of the death-rate.

General conclusions.

* See Appendix, III.

ment, some hundreds of families have been driven from their homes to crowd places already full; that the pressure was likely to be felt most by the occupants of tenement property; that over-crowding is exercising an increasingly destructive influence on the health of the people; that the provision of more house-accommodation has become a matter of the first importance; and that the case, not having been met by private enterprise, demands the prompt and energetic action of the Corporation.

PAUPERISM AND THE HIGH DEATH-RATE.

Largest
expenditure
where there
has been most
disease.

There is an almost constant relationship between the amount expended in the relief of the poor and the death rate. In the districts where there is most pauperism, we find most disease and death. A glance at the statement of the relief administered during the week ending February 16th, 1867, will show this:—

District.	Persons	Families	Cost			Corresponding week last year			
						Persons	Cost		
Eastern...	1577	699	121	17	1	1337	103	7	9
Southern..	1343	602	92	11	6	1087	82	5	4
Westgate.	1270	585	98	5	2	1104	90	7	3
Northern..	882	404	61	13	0	870	65	16	3
Western...	762	348	61	3	6	751	50	0	0
			5834	2608	£435 10 6	5149	£392 16 7		

Pauperism and disease act and re-act upon each other, but, in Newcastle, in recent years, there has been no special cause of increased pauperism, except the prevalence of disease.

Table, showing the number of ordinarily able bodied men who have been relieved in Newcastle-upon-Tyne Union, in each of the half-years, 1863-6, on account of their own sickness, that of their family, or want of work.

In 1866, disease
the cause of
much pauper-
ism.

	1863.		1864.		1865.		1866.	
	1st half- year.	2nd half- year.	1st half- year.	2nd half- year.	1st half- year.	2nd half- year.	1st half- year.	2nd half- year.
IN-DOOR.....	25	13	10	6	3	1	4	2
OUT-DOOR.								
Own sickness...	489	494	548	487	475	406	589	450
Sickness of fam.	124	101	80	53	74	63	85	64
Want of work...	62	5	8	3	5	...	5	8
	700	612	646	549	557	470	683	524

In 1863, 105 able-bodied men were relieved on account of want of employment; while in 1864, the numbers were 27; in 1865, 9; and in 1866, 19. There were 983 ordinarily

able-bodied men who, during 1863, received relief on account of their own sickness; in 1864, 1035; in 1865, 881; and in 1866, 1039. On comparison, the first half-year of 1866, is the highest, and corresponds with the six months of greatest mortality from typhus.

RESULTS OF SANITARY INSPECTION.

We have thus arrived at the fact that the greatest mortality of the past year is found in those districts where there are most tenements occupied by the poor, and that it is in these tenements there has been most overcrowding. But the question arises, are there any other circumstances, connected with such property, tending to impair health, which may fairly be regarded as under human control? To this question the details of the Sanitary Inspection, conducted by Mr. Ackrigg and others, under the supervision of your sub-committee, furnish the fullest answer. These details have already been of great value in guiding the efforts of the Sanitary Officers, and will for a long time to come furnish authentic and reliable data to the sanitary authorities in the exercise of the larger powers conferred upon them by the Act of 1866.

Value of sanitary inspection.

Your sub-committee feel it their duty here to state that throughout their enquiry they have had the cordial and valuable assistance of the various Corporate Officials, and the willing and courteous co-operation of several members of the Town Improvement Committee, and that the entire expenses of the enquiry have been borne by the Corporation.

Cost borne by Corporation.

The summary of the Sanitary Inspection, which will be found in the Appendix, demands the closest examination. The general results point to the necessity for vigorous and immediate action. It was found most convenient for purposes of inspection, to adopt the division of the town into Police Districts, which unfortunately renders the application of the data to the vital statistics of the Registration Sub-Districts exceedingly difficult, yet their general bearing upon the death-rate of the borough is sufficiently obvious.

NUMBER OF ROOMS LET IN TENEMENTS.

At the date of inspection, in December last, 23,566 rooms within the borough were measured and inspected. Of these 408 were empty, or closed by order of the magistrates as unfit for human habitation; 23,159, mostly let as tenements, were occupied by 55,366 persons, or more than one-half of the total population of the borough at the last census. This is the account of the number of occupants of such rooms given by the people themselves; and, if it errs at all, it will not be an error of excess. They are classified thus:—Fathers, 10,748; mothers, 12,643; sons, 15,099; daughters, 13,475; lodgers, 3,401. A glance at the table suggests that possibly some of the lodgers are returned as sons, and that the number

3,401 persons lodging with families occupying tenements.

of lodgers named is probably somewhat below the truth. The average daily number of persons sleeping in the common lodging houses during the past year was 525, which with the 3,401 persons lodging with families in tenements makes a total of 3,926 persons of the labouring class occupying lodgings within the borough. This lodging class is pretty equally distributed in the different districts of the town, according to the rate of population. In the Manors or A division there are 430; in Westgate or B division, 1,633; in Prudhoe or C division, 612; and in Ouseburn or D division, 726.

Regulations
against over-
crowding
worthless until
better houses
are provided
for the poor.

It is of the utmost importance that stringent regulations should be enforced against overcrowding; and yet, owing to the difficulty, or rather the impossibility, of the poor finding accommodation elsewhere, repressive measures would only heighten the mischief. In this as in other details of sanitary inspection, overstrictness may become oppression, and aggravate instead of alleviating the hardships of the poor. No radical cure can be effected until there is increased house accommodation in the borough, or until suitable and sanitary lodging houses are provided for this large portion of our population. Yet much can be done to mitigate the evil, by the vigorous but cautious application of the Sanitary Act of last session. Many of the 525 persons found nightly in our common lodging houses are vagrants and tramps, while the 3,401 persons living in ordinary lodgings in tenemented property are mostly labouring men, earning weekly wages. And yet, owing to the regulations of the Common Lodging Houses Act, which has had a most beneficial effect, the former are better cared for than the latter. 250 cubic feet of air space is the smallest amount required for each person, but except at special times, the vagrants and tramps get a great deal more. Indeed, on an average, during the past year each of them nightly has had very nearly a room to himself, for, in the 157 lodging houses under inspection, there are 502 sleeping rooms, exclusive of 210 kitchens.* No rooms used as kitchen or scullery for the lodgers, are allowed to be occupied as sleeping apartments; rooms on the basement, or below the ground level, must not be used as sleeping apartments; nor persons of opposite sexes occupy the same sleeping rooms, except married couples, or parents and their children under fourteen, or children under ten years of age. Then there are provisions for securing cleanliness, ventilation, and other essentials of healthy existence. Such are the measures, diligently and energetically enforced by the inspectors, which have secured to the common lodging houses, during the past year, a comparative immunity from disease. Moreover, in any case of contagious or infectious disease, the patient is immediately removed to hospital, and under no circumstances allowed to be treated in the lodging house. During the past

Common lodging
houses
healthier than
tenements.

* Appendix, IV.

year there were 14 cases of infectious disease, 12 of fever, 1 of small pox, and 1 of cholera, in the common lodging-houses; but the small extent to which those zymotic diseases spread among a class of people, from their habits and indigence, peculiarly susceptible to them, is a proof not only of the advantage of strict regulation and inspection, but of the power which isolation and disinfection have over the spread of such diseases.

The lodgings occupied by labouring-men in the often already crowded tenements have no such advantages. There is no arrangement to secure proper breathing space. Kitchen, scullery, living room, if, indeed, there are any distinctions, are all used as sleeping rooms. The windows are often kept closed, especially in cold weather, and in case of sickness, the air is rarely renewed. In some instances underground kitchens are used for all the purposes of life, until the poor children are not loth to escape from them to the dirty street, where at least they can breathe. In many instances there is no provision for cleanliness or ventilation, and all the decencies of life are flagrantly disregarded. The Council has judiciously taken powers under the Act of 1866, for fixing the number of persons who may occupy a house, or part of a house, which is let in lodgings or occupied by members of more than one family; and now that the burden of proving the allegation that they are members of the same family is made to lie on the inmates of any house, or part of a house, let in lodgings, it would probably be found that there were more than 3,401 lodgers in such tenements. Yet, unless we are prepared to drive away a large portion of our labouring population, or to lessen the overcrowding in one part only to increase it in another, the Sanitary authority must allow those parts of the Act to remain a dead letter, until better provision is made for the accommodation of such persons.

The other provisions of the Act "for the registration of houses thus let or occupied in lodgings; for the inspection of such houses, and the keeping the same in a cleanly and wholesome state; for enforcing therein the provision of privy accommodation and other appliances and means of cleanliness in proportion to the number of lodgings and occupiers; the cleansing and ventilation of the common passages and stair-cases; and for the cleansing and lime-whiting at stated times of such premises;"—these provisions, without any cost to the public, and at the sole expense of the owners of such property, the Sanitary authority might and should enforce without delay.

There are in this town 6,269 single rooms, occupied by 22,328 persons. Some of these rooms may be inhabited by single persons, by widows, or even by a married couple, without injury to health; but, under the most favourable circumstances, they cannot be regarded as suitable homes for

Want of arrangements in tenements occupied as lodgings by working people.

Some provisions of Act of 1866 a dead letter.

Other provisions that should be enforced.

Single rooms unsuitable for families.

families consisting of a number of children. The average number of cubic feet to each tenemented room is 1,447, but when such rooms are occupied by whole families, and are used for every necessity of life, by day and by night, in health and in sickness, we need not wonder that they become hot-beds of the diseases which thrive and spread in vitiated air. When we consider that many of these rooms are often found in enclosed courts and narrow alleys, shut out from air and sun, we should look upon them as charnel houses, rather than as domiciles for living human beings.

WATER SUPPLY OF TENEMENTS.

2,594 rooms with
7,962 inmates
without water
supply.

At the date of inspection, there were 20,407 rooms, the occupants of which had access to water taps, while 565 families depended upon pans. In some cases one tap has to suffice for 20 or 30 families, and is only reached by going down two or three pairs of stairs. There were 2,594 rooms, with 7,962 inmates, without water supply—a fact traceable to the negligence or cupidity of their owners. It cannot be too often insisted that, next to pure air, a constant and full supply of pure, fresh water is one of the essentials of healthy life; and the water should be brought into the dwelling itself. With scarcely an exception, the whole of the tenement property in the town, where supplied with water at all, is supplied by stand pipes; necessitating that in wet, snow, or frost, and in sickness, every drop of water should be fetched, sometimes a considerable distance. What is difficult to be done is often left undone; and with an out-door water supply it cannot be said that the complete washing of the body in a working man's home is an easy matter; nor need we wonder to find numerous instances where the adult inmates of such rooms have not enjoyed a complete ablution for months together. It is true that the Corporation, with a wise economy, has provided baths for the people; but these can never supersede the necessity for water in the dwellings of the poor. Every floor in tenement property should have its water supply; and the enforcement of such a regulation upon the owners would be an act of justice to the Water Company, as well as of humanity to the poor tenants. The additional revenue which the Water Company will derive, under such regulation, should act as a stimulus to that Company to incur the expense of making better arrangements for filtering their water.

ASHPIT ACCOMMODATION OF TENEMENTS.

7,206 rooms
without ash-
pit accommo-
dation.

The number of rooms in the borough without ashpit accommodation is 7206, but it is doubtful whether their sanitary condition is worse than that of many of the other tenement houses, where the ashpits are large, and in close proximity to the dwellings. What is wanted is that the ashpits should be

so arranged as to produce neither disease nor discomfort from being too near the dwelling, and that there should be facilities for the proper and rapid removal of their contents. They should be dry, and while freely exposed to the air, should be roofed, in order to keep out rain; and only to be used for the reception of ashes and dry refuse. In case "slops" are thrown into them, they should be drained, as moisture favours the decomposition of animal and vegetable substances. Where yards are small, ashpits should be dispensed with altogether, and the whole of the solid refuse of each tenement be placed in a scuttle or box, and removed daily.

From a return furnished by the Road Surveyor, it appears that the average cost to the Corporation of the scuttle ashes is 1s. per load, while that of the ashpits is 1s. 3d. per load; and as the refuse of the town amounts to about 5000 loads per month, there would be a saving of several hundreds of pounds per annum, by the adoption of the system of daily removal. The system has been in constant operation in the city of Edinburgh for twenty years, and is found as economical as it is efficient. The sale of the refuse brings into the municipal treasury £7000 per annum, being a saving to the inhabitants of threepence per pound in the rate of assessment for general police purposes.* The farmers in this neighbourhood object to the inorganic portion of the refuse, although it would be advantageous to their clayey soils; and if the Corporation secured the freehold of quarries and deans into which such portion of the refuse is now "tipped," at a considerable cost, and when they are filled up, appropriated them partly to building purposes and partly to play-grounds, a still greater saving would probably be effected. Our scavenging, in proportion to the area of the town, and the number of its paved streets, is much more costly than that of other large towns, without being more efficient. The adoption of a better system, and the letting the work to contractors, would secure greater efficiency at less cost. But no system can be satisfactory that leaves for months, close to human dwellings, in long, narrow back streets, large quantities of decomposing matter. As the result of careful and elaborate experiment, it is ascertained that the amount of carbonic acid gas found in the neighbourhood of middens is more than twice the quantity found in the open streets;* and that a very small increase in the amount of carbonic acid, continually breathed, depresses vitality, and predisposes to disease. There are constitutions that have great powers of resistance, and that long hold out under unfavourable circumstances, but children and delicate persons more readily succumb. Both from the diminution of oxygen, and the increase in carbonic acid, the atmosphere of our yards is often a congenial soil for the diffusion, if not the development, of miasmata; and the numerous erections with which

Advantages of
daily removal.

Experience of
Edinburgh.

Scavenging
should be done
by contract.

The midden
system fruitful
of disease.

* Appendix, V.

they are often disfigured, prevent the free play of air upon the backs of our houses, and heighten the evil.

PRIVY ACCOMMODATION OF TENEMENTS.

The conversion of privies into water closets of doubtful utility.

Better to adopt a system of daily removal or the earth closet or tank plan.

14,556 persons in 4132 rooms without any accommodation.

The number of tenement rooms in the borough with water closet accommodation, is 5091, which in some cases only means that each family has access to one in common to a whole block of such property. Three-fifths of that accommodation is found in the western district. There are 14,345 rooms with privy accommodation, many of the privies, however, being common to several rooms. Your sub-committee would not recommend the immediate conversion of all those privies into water closets—a change that would be costly, wasteful, and in the hands of untidy people, far from an improvement. At least before it is attempted, if the system of daily removal is not adopted, a fair trial upon a somewhat extended scale, should be given to the earth closet,* and the tank plan,† either of which seems to possess all the advantages of the water closet system, without any of its disadvantages. However revolting to the sense of decency may be the method of having common privies crowded close to the dwellings in the ordinary courts and yards; and however great an eyesore and a nuisance a stack of such places, in front of the houses, may be, to be without any convenience is a lower depth of physical degradation still; and to all its injurious influences 14,556 inhabitants of Newcastle, living in 4132 rooms, without either water closet or privy accommodation, are continually exposed. It need scarcely be said that no time should be lost, wherever it is possible, to compel the owners of such property to remedy this foul and wretched state of things. Where it is impossible, as soon as house room is provided for the tenants, such property should be pulled down.

HOUSE DRAINAGE.

Sanitary benefits of good drainage.

No house should be erected without adequate drainage; indeed both sewers and streets should be constructed before the houses are built, a plan as much to be recommended on economical as on sanitary grounds. Good drainage diminishes mortality. A few years ago, it was found in one parish in Leicester, containing a population of 22,000, mostly artisans, that the average age at death in the

Drained streets was	...	...	23½ years.
Streets partially drained	...	...	17½ „
Streets entirely undrained	...	...	13½ „

In Salisbury, the annual mortality before drainage was about 28, and after drainage about 21 in the thousand. In Ely, the reduction was from 26 to 21 in the thousand. The

* Appendix, VI.

† Appendix, VII.

amount of improvement possible under this head in Newcastle will be seen in the fact that there are 2086 rooms let in tenements with indifferent drainage; 2588 with bad drainage; and 2090 with none at all; making a total of 6764, with an estimated population of nearly 20,000.

6764 rooms with imperfect drainage.

CUBICAL AIR SPACE IN TENEMENTS.

It was ascertained by the sanitary inspection, that there are 7779 persons living in tenements with less than 300 cubic feet of room space, and 18,354 with less than 400. The Sanitary Committee, in submitting their proposed regulations to the Home Office for approval, sought to fix 250 cubic feet as the minimum for each person, but the Home Secretary declined giving his sanction to a less space than 300 feet, and allowed that small space only for one year. Two-hundred and fifty cubic feet may be considered enough for the mere night reception of lodgers in a licensed lodging house, although in Liverpool and other large towns, 300 feet are required. But persons living constantly in one room, by night and day, and carrying on therein all the domestic offices, require for each individual more than 300 cubic feet. The allowance of space to the pauper as fixed by the Poor-law Board is, when in good health, 300 cubic feet; when sick, 500; and now proposed to be 850 for ordinary, and 1200 for offensive cases.* The scale said to be enforced by the Marylebone justices is 400 feet. The army scale is 800. The allowance to the convicted criminal is 1000 cubic feet of air, regularly changed; while 1500 is the scale of our best hospitals. These are the lowest amounts of space, which, with a due regard to economy, are considered compatible with health in workhouses, barracks, gaols, and hospitals. The thief is better cared for, in this and in other respects, than the honest labourer. "The Englishman's house is his castle," and in this case it has to be his kitchen, scullery, wash-house, laundry, living-room, lodging-room, and hospital, all in one; and when he dies, it is his dead-house. These are the abodes of fever, the centres of contagion, where children pine and die, or drag out a weary and feeble existence, and where adult life is ever in the shadow of the grave. A child dies of scarlatina, and the living lie on the same pallet with the dead. An adult dies of typhus, and so intense is the poison, in the exhausted air of the single room, that scarcely a mourner who enters escapes. Thus, not only the diseased and the healthy, but the living and the dead are lodged in one room, where the sanctities of life and death disappear.

18,354 with less than 400 cubic feet of air space to each.

Which is too little when the same room is used both for living and sleeping in.

The criminal better off than the honest workman.

The living and dead in one room.

IMPERFECT MEANS OF VENTILATION.

In many cases want of air-space is aggravated by deficient means of ventilation. There are 1382 tenement rooms with

* Appendix, VIII.

2631 tenements
with imperfect
means of
ventilation, or
none at all.

imperfect means of ventilation, and 1249 with scarcely any means of ventilation at all. Three hundred cubic feet of air-space where fresh air can pass freely through a room, are more valuable than thrice the quantity where it cannot. What then must the atmosphere be, where there is not half the breathing space required, and where from structural defects it is all but impossible to change the air. It is in such places that scrofulous diseases, consumption, and fever find their hundreds of victims every year.

ACCUMULATION OF SANITARY WRONGS.

Sanitary evils
found in great-
est intensity
in eastern and
southern
districts.

These life-destroying evils are variously distributed over the borough, but they are found in greatest intensity and combination in the eastern and southern districts. Of 940 persons with less than 200 cubic feet to each, 637 reside in the Manors and Ouseburn divisions, and 303 in those of Prudhoe Street and Westgate. Of 7,779 with less than 300 cubic feet of air-space, 4,276 belong to the former, and the remainder to the latter. Of 4,132 rooms, with a population of 14,556, without either water-closet or privy accommodation, not fewer than 3,473 rooms with 10,924 inmates, are found in the eastern and southern districts, while in the same districts we find 6,822 persons without water supply. Here, therefore, as might be anticipated, we have the highest mortality. A glance at the topographical chart of the deaths from scarlatina and typhus during the past year, will shew that these are the districts where scarlatina and typhus have been most fatal, and that there are other parts of the town, with some thousands of inhabitants, where there has not been a single case of death from either of those diseases.

The census
enumeration
districts
should be made
the basis of a
more complete
analysis of
vital statistics.

For the purposes of the last census, the various Registrars' sub-districts were divided into Enumerators' districts, comprising several streets, with a population of from 3000 to 4000, and an application was made to the Registrar-General for a list of such enumeration districts. His reply was that the information could not be obtained, the census office having been closed since 1864. Had such information been accessible, it would have been easy to ascertain the rate of mortality in each of those smaller sub-divisions; and from a careful examination of the vital statistics of last year, your sub-committee have come to the conclusion, that there are portions of the town where the death-rate has not exceeded 25 in the thousand; while there are others where it has not been less than 54 per thousand for the year.

THE CAUSES OF DEATH.

In each class of
disease, the
death-rate in
Newcastle
above the
average of
England.

An investigation of the causes of death in the borough for 1866, confirms the general conclusion that much of the excessive mortality has resulted from unsanitary conditions, and pre-eminently from vitiation of the atmosphere produced

by over-crowding. In each of the five classes into which diseases have been divided by the Registrar-General, the mortality in Newcastle-on-Tyne, during the past year, has been considerably in excess of the average for England; but the excess has been greatest in the class that may be popularly known as foul-air diseases. To violence, 123 deaths are attributed, being to the average of England as 101 to 80, or an excess of 21 deaths in 100,000 persons living. The extent to which the labouring population of the town and district are engaged in trades dangerous to life and limb, explains the fact, and points to the necessity of employers and workpeople using all the means which science has provided for preserving life, and of co-operating, by permanent sick clubs, to provide against accidents. Under the head of developmental diseases, 581 deaths have been registered, being to the average of England as 417 to 359, or an excess of 58 deaths to 100,000 persons living. The temperature was variable, and the weather sometimes very severe; the year has thus been fatal to 196 old people, being at the rate of 153 to 100,000 living, or 10 in excess of the average of England. But the year 1866, has been much more fatal to the young than to the old. To local causes, 1342 deaths are ascribed, being in the ratio of 1109 to 814, or 295 in 100,000 persons living, above the average of England. But it is probable that a considerable portion of the 104 deaths ascribed to ulceration of the intestines, was really due to typhoid fever, thus increasing the number of the zymotic class. Constitutional diseases were fatal to 716 persons, being at the rate of 622 deaths to 100,000 living, or 186 in excess of the average for all England, which is 436 deaths to 100,000 persons living. It cannot be doubted that the unsanitary conditions disclosed by the recent inspection, exert a pernicious influence upon the human system, and contribute largely to the excessive mortality from diseases of this class. But it is in the zymotics, where these evil conditions make themselves most rapidly, if not most permanently felt, that we find the widest disparity between the death-rate of Newcastle in 1866, and the mean annual mortality of England. The registers record 1145 deaths under the zymotic class of diseases, whereas at the average of England, the number should not have been more than 618. To 100,000 persons living, there were 937 deaths from zymotic diseases, being 431 in excess of the mean annual mortality for England, which is 506 in 100,000. To say that the high death-rate of 1866 has arisen chiefly from the prevalence of scarlatina, is really to throw no light upon the subject; for scarlatina has prevailed, during the past year, in other large districts of the country, where there has been a much lower death-rate; and the important questions still remain, why it has been so fatal here, and whether the conditions that have heightened its mortality have not had the same effect upon other diseases

Deaths from
violence as
101 to 80.

From develop-
mental
diseases as
417 to 359.

From local
diseases as
1109 to 814.

From constitu-
tional diseases
as 622 to 436.

From zymotic
diseases as 937
to 506.

Comparison of the deaths in the different classes and orders of diseases in each sub-district, with the mean of England.

Table, showing the number of deaths recorded in each of the registration sub-districts of Newcastle-on-Tyne, the causes of death arranged in classes and orders, and the proportion of deaths to 100,000 persons living, compared with the mean annual rate of mortality in England, during the fifteen years 1850—1864.

CLASSES.	CAUSES OF DEATH.	St. Nicholas.		All Saints.		St. Andrew.		Westgate.		Byker.		Newcastle-on-Tyne.		Mean Annual Mortality in England for fifteen years, 1850-64.
		No. of deaths recorded in 1866.	Proportion to 100,000 persons living.	No. of deaths recorded in 1866.	Proportion to 100,000 persons living.	No. of deaths recorded in 1866.	Proportion to 100,000 persons living.	No. of deaths recorded in 1866.	Proportion to 100,000 persons living.	No. of deaths recorded in 1866.	Proportion to 100,000 persons living.	No. of deaths registered in 1866.	Proportion to 100,000 persons living.	
	All causes	680	4018	1002	3491	486	2745	1388	3050	394	2962	3950	3235	2219
	Specified causes	670	3959	985	3433	478	2700	1380	3027	394	2962	3907	3200	2194
	(CLASSES)													
I.	Zymotic diseases	172	1023	351	1219	137	773	373	812	112	842	1145	937	506
II.	Constitutional	131	775	170	594	91	515	249	549	75	560	716	622	436
III.	Local	230	1377	319	1112	193	1089	482	1059	118	882	1342	1109	814
IV.	Developmental	80	474	114	397	52	294	255	561	80	597	581	417	359
V.	Violence	57	337	31	109	5	29	21	46	9	67	123	101	80
	(ORDERS)													
I.	1 Miasmatic	163	964	343	1194	136	768	362	795	110	823	1114	904	483
	2 Enthetic	2	11	4	14	...	...	7	15	2	15	15	12	6
	3 Dietic	7	41	4	14	1	5	4	8	...	...	16	13	10
	4 Parasitic	...	...	...	...	...	...	...	...	...	...	...	...	6
II.	1 Diathetic	14	82	19	66	5	28	36	79	7	52	81	66	87
	2 Tubercular	117	692	151	526	86	483	213	467	68	508	635	506	349
III.	1 Diseases of nervous syst.	75	444	114	396	61	345	154	338	34	254	438	315	278
	2 Organs of Circulation	23	136	37	129	25	142	48	104	13	97	146	119	82
	3 Respiration	66	390	120	418	67	378	136	408	45	236	484	436	311
	4 Digestion	48	284	38	133	34	194	75	165	22	164	217	175	101
	5 Urinary system	11	65	5	17	5	28	11	24	2	15	34	27	22
	6 Organs of generation	4	23	3	10	1	5	2	4	1	7	11	8	5
	7 Organs of locomotion	3	17	2	7	...	...	1	2	1	7	7	5	7
	8 Integumentary system	...	...	...	...	...	...	5	11	...	...	5	4	5
IV.	1 Developmental diseases of children	1	6	3	10	1	5	5	11	5	37	15	12	99
	2 Of Adults	1	6	1	3	...	...	4	8	1	7	7	5	11
	3 Of Old people	38	225	23	115	15	85	84	184	26	9	196	153	143
	4 Disorders of nutrition	40	233	77	268	36	206	162	356	48	309	363	300	104
V.	1 Accident or negligence	55	325	28	97	5	23	18	40	9	66	115	92	69
	2 Homicide	...	...	1	3	...	...	...	...	...	...	1	...	1
	3 Suicide	2	12	2	7	6	...	3	6	...	...	7	5	6
	Unascertained	10	59	17	58	8	45	8	17	...	...	43	35	...

The foregoing table shows that in the principal orders of diseases, as well as in the five classes, the death-rate in Newcastle exceeded the average of England. Miasmatic diseases were as 904 to 483; enthetic as 12 to 6; dietic as 13 to 10; parasitic, no returns; diathetic as 66 to 87; tubercular as 506 to 349; diseases of nervous system as 315 to 278; diseases of the organs of circulation as 119 to 82; diseases

of the respiratory system as 436 to 311; of the digestive system as 175 to 101; of the urinary system as 27 to 22; of the organs of generation as 8 to 5; of the organs of locomotion as 5 to 7; of the integumentary system as 4 to 5; the developmental diseases of children as 12 to 99; of adults as 5 to 11; of old people as 153 to 143; the disorders of nutrition as 300 to 104. The greatest excess above the average of England, is found the miasmatic and tubercular orders, and in the diseases of nutrition. The figures may be read as deaths to 100,000 persons living, and a comparison may be instituted between each of the registration sub-districts under each head.

Comparison of the deaths in different orders of diseases with the mean annual mortality of England.

DIAGRAM OF MORTALITY.

More fully and more impressively than any merely written description, the diagram at the end of this report shews the variations in the rate of mortality from fortnight to fortnight; the influence of particular diseases upon the death-rate; the rise and fall of epidemics; the relation of the deaths of children under five years, and of the deaths from zymotics, to the deaths from all causes; and the effects of seasons and of atmospheric conditions upon the various currents that go to swell the death stream.

The diagram illustrates the rise and fall of diseases, and the influence of season and climate.

FIRST QUARTER.

The year began with a high rate of mortality; 35·8 per thousand in the first week. The height, 41·0, to which it rose on the week ending January the 20th, was only once exceeded during the whole year, namely, in the week ending the 15th December, when it became 41·4. At the commencement of the year there was no epidemic of scarlatina, as at the close, yet the line of infant mortality on the diagram, gives character to that of the deaths from all causes, almost as much in the one case as the other. In January, 3 deaths from scarlatina were registered; in December, 159; yet the average death-rate for January was 34·7, and for December 37·3, the difference between them being only 2·6 per thousand. Nothing could more conclusively demonstrate the existence of permanent causes of ill-health in the borough. The temperature of January was comparatively mild; the mean heat of the air being 42° Fahr., with slight showers. Typhus was fatal in 17 cases; measles in 17; phthisis in 22; other tubercular diseases in 13; diseases of the respiratory system, excluding phthisis, in 49; and atrophy and debility in 32 cases. Infant mortality accounts for 48 per cent. of the whole.

First quarter. High death-rate at commencement of 1866.

And high rate of infant mortality.

In February, the temperature was slightly lower than in January, with very little rain. The mortality of children below five, fell rapidly during the month, and exerted an

Fall in general and infantile death-rate in February.

Fall in
death rate.

appreciable effect in reducing the general death-rate. The deaths from zymotic diseases, which had risen to 42 in the fortnight ending 3rd February, gradually fell during the month. Even typhus, which now reached its culminating point, accounting for one-eighth of the entire mortality of that fortnight, began to recede.

Continued in
March, though
typhus rose.

In the latter half of March, however, with a moderate temperature and more moisture, typhus again rose, as also the death-rate from tubercular and zymotic diseases, swelling the stream of infantile, and thus of general mortality. Still, the month shewed an improvement in the public health as compared with the preceding, and a still more marked improvement as compared with January. This is most seen in the Westgate sub-district, where the death-rate during the last three weeks in March stood at 22·9 per thousand, at 21·8 in the week preceding, and 20·6 during the week succeeding, that period. This is by far the lowest rate in the Westgate and Elswick sub-district for any five weeks during the whole year, and corresponds with a period of low temperature and slight rainfall.

SECOND QUARTER.

Second quarter,
with a rising
temperature
shows a
continued
ebbing of the
death stream.

The diagram shows that the improvement in the public health, attained towards the close of the first quarter of the year, was maintained in the second quarter. The mean temperature for the 13 weeks ending the 31st March, was 38·9 Fahr., and the rainfall 3·5 inches; while for the 13 weeks ending June 30th, the mean temperature was 50·4 Fahr., and the rainfall 4·6 inches. Corresponding to the rise in temperature, there is a gradual and steady fall in the line of general mortality. The mean temperature rose from 42° in March to 46° in April, 51° in May, and 58° in June. The rainfall, though in excess of the preceding, did not reach one-half the quantity of the following quarter. With this warm and dry weather, the mortality which was 29·9 per thousand in April, fell to 29·6 in May, and 26·7 in June. The influence of the weather is especially seen in the line of the diagram which represents typhus. That line which on the 31st of March stood at 17, goes on declining, until, in the fortnight ending the 7th July, it reaches 1. The declination of the line representing the zymotic death-rate, corresponds with that of typhus, until the 10th of June, when it is arrested in its fall by an outbreak of scarlatina, and a considerable increase of diarrhoea. All through the second quarter the number of deaths from bronchitis and pneumonia continued to diminish. Not so with the tubercular order of diseases, which, though experiencing considerable fluctuations, on two occasions during the quarter rose higher, and maintained throughout a greater fatality, than in the first quarter of the year. The June quarter was less fatal to young children

The influence of
warm and dry
weather upon
typhus.

Increase of
deaths from
tubercle.

Considerable
fluctuations of
death stream.

than any of the other quarters of the year. Still, a considerable rise is observed in the middle of May; out of 140 deaths of all ages, 66 being of children below five. Scarlatina accounts only for one of those deaths, measles for five, while of the remaining 60, 23 are attributed to atrophy and debility, 8 to convulsions, 7 to hydrocephalus, 4 to affections of the brain, 4 to tabes mesenterica, and 6 to consumption. A sudden fall of temperature occurred in the first week of May, and this, doubtless, had its influence in nipping some of these young buds of human being. But so dark a roll of youthful mortality in a season so full of life, and, upon the whole, so favourable to life, proves the existence of persistent sanitary evils acting injuriously upon the population.

Rise of death-rate in the middle of May.

THIRD QUARTER.

In the September quarter, the diagram represents a remarkable spectacle. The line of general mortality reached its lowest point for the year in the month of July. The deaths registered during the fortnight ending the 7th and 21st July, were, respectively, 119 and 117, or 25.3 and 24.9 per thousand. The week of minimum mortality for the year, was the week ending the 7th July, the death-rate for that week being 22.6, or only a few decimals above the mean annual mortality for all England. The zymotic death-rate, which reached its lowest point during the fortnight ending the 9th of June, was, under the influence of scarlatina, which had become epidemic, beginning steadily to rise, but had not yet made itself felt. Indeed, as if to give time for preventive measures, scarlatina which had stood at 9 for the fortnight ending the 23rd of June, fell to 3 for the fortnight ending the 7th of July. Over the same periods, diarrhoea, favoured by a higher temperature, rose from 4 to 9. The line of infant mortality which had reached its lowest point in the fortnight ending the 9th of June, from that point began slowly and regularly to rise; and from 43 in 129, or 33 per cent., by the fortnight ending the 7th of July, had reached 55 in 119, or 46 per cent. of the whole; the disparity arising from a decrease of 10 in the deaths at all ages, and an increase of 12 in the deaths of children below five. The deaths from respiratory diseases, excluding phthisis, were much below the average, and continued to fall; while those from tubercular diseases, including phthisis, very slightly rose. Notwithstanding these adverse influences, with which the September quarter commenced, the fortnight ending the 21st of July, showed a lower mortality than any other fortnight in the year, the number of deaths being 117, or 13 below the corrected average fortnightly number. With no medical officer of health to analyze the returns, and charged with responsibility to guide its efforts, the Public Health Committee, which had met weekly, when cholera seemed imminent, uninfluenced by advice unofficially

The third quarter at its commencement shows the lowest mortality for the year.

Gradual rise of infantile mortality, an ominous fact.

In the healthiest fortnight of the year, the infantile death rate accounts for 56 per cent. of the whole deaths.

Sudden and marked rise of the death line for the fortnight ending the 4th of August.

Corresponds with a lower temperature

and excessive rainfall.

tendered, and lulled into security by the declining death-rate, had begun to intermit its meetings, although beneath the pleasant returns, lay an ominous fact which should have awakened all its vigilance, and called forth all its activity. Of the 117 deaths recorded during the fortnight, no fewer than 66, or 56 per cent. were of children under five years of age. The sensitive and susceptible constitutions of children give the earliest and most delicate indications of any unfavourable hygienic conditions affecting the public health, and where the infant mortality is more than one-half of the whole, it is certain that adult life cannot attain its highest vigour, and that agencies are at work which inevitably lead to a physical, intellectual, and moral deterioration of race. For the fortnight ending the 4th of August, the diagram presents a startling phenomenon. At one bound, the death-stream, which had ebbed to its lowest during the preceding fortnight, rose to spring-tide, and nearly reached its highest limit for the whole year. From 117, or 13 below, it rose to 175, or 45 above, the corrected fortnightly average, or from 24.9 to 37.2 per thousand. The week ending the 4th of August, was the more fatal of the two; the death-rate standing at 40.5 per thousand, as compared with 33.3 for the preceding week. This black fortnight was fatal to life all over the borough, but most fatal in the Byker sub-district. In Westgate the deaths were 32.6, St. Andrew 36.4, St. Nicholas 35.8, All Saints 39.0, and Byker 48.7. All ages suffered, but the young most. The infant mortality rose to 86, being an increase of 20 upon the preceding fortnight. Of persons between twenty and forty years of age, 30 died, being the largest number at that age of any fortnight during the year. This high mortality corresponds with a diminution of heat, and an excessive rainfall. The highest reading of the thermometer, 78° Fahr., for the year was registered in the week ending the 14th of July, the lowest for the week being 50°. The mean temperature for the week was 68° Fahr., being the highest mean of any week for the year. In the following week, the mean temperature fell to 58° 5, or 10° Fahr., and there was no rainfall. During the week ending the 28th of July, when the death-rate rose to 33.3, the mean temperature was 57°, with slight rain. In the week ending August the 4th, when there was the greatest exacerbation of the death-rate, the mean temperature was still 57°, but the amount of rainfall was by far the highest for the year. During that one week there fell 2.682 inches of rain, or more than one-half the amount of the previous quarter. As yet the line marking scarlatina had not risen above the point which it reached on the 9th of June, the number of deaths for each fortnight being 9. The deaths from diarrhoea and cholera were 11, the same number as in the previous fortnight. The zymotic death rate neither rose nor fell. Diseases of the respiratory system rose from 8 to

15, but were still below the fortnightly average for the year. There were many fortnights in the year much more fatal to old age. The deaths from atrophy and debility were in excess of the average; and those from tubercular diseases rose from 25 to 42, being the highest point reached during the year, phthisis accounting for 24, and tabes mesenterica 15. Where the thread of life had been worn down by long-continued disease, it seems to have been snapped asunder by the adverse climatic influences of that fortnight. The number of children under five, who died during that fatal fortnight, formed 42 per cent. of the entire mortality and was exceeded only three times during the whole year.

Deaths from atrophy and debility, and from tubercle, greatly in excess.

In August, the general line of mortality fell considerably, but did not again reach so low a point as that from which it so suddenly rose on the 21st of July. For the fortnight ending the 18th August, it fell to 159, and on the 1st of September it reached 141. In the first of these fortnights the infantile mortality fell to 69, and in the second rose to 73, or 51 per cent. of the whole. Under the influence of scarlatina which rose from 9 to 17 and 22, the line representing zymotics was forced up from 32 to 40, and then to 54. In the first, the deaths from diarrhoea and cholera were 10, in the second 14. The deaths from tubercular diseases fell from 42 to 28, and again to 17, while diseases of the respiratory system, which on the 4th and 18th stood at 15, on the 1st of September fell to 7. The month was characterized by a steady and moderate temperature, slightly increasing towards its close, with comparatively fine weather.

Continuous fall of death-rate during August from the high point reached on the 4th.

Scarlatina and diarrhoea rose

Tubercular and respiratory diseases fell.

The diagram for September shows nearly as great a rise as the previous month did a fall; the general mortality from 141 to 149 and 170; the infantile from 73 to 74 and 85; tubercular diseases rose to 30 and then fell to 21, while diseases of the respiratory organs rose from 7 to 15; and then receded to 12. Diarrhoea and cholera fell from 14 to 7, and then rose to 16. Typhus fell from 6 to 4, and then rose to 8. Scarlatina fell from 22 to 20, and then suddenly rose to 42. The mean temperature was 52°, with much rain.

Continuous rise of death-rate in September.

Tubercular and respiratory diseases rose and fell.

Diarrhoea, typhus, and scarlatina and then

FOURTH QUARTER.

The diagram for the last quarter of 1866, shows, with slight intermissions, a rise in the death rate each month. The December quarter, in the vital statistics of Newcastle, is generally the most unfavourable to human life; but in 1866, it showed a mortality which, in a long series of years, has rarely been exceeded, even in epidemics of cholera. It is only among barbarians, or in times of war, famine, or pestilence, among civilized peoples, that the deaths are more numerous than the births; and the occurrence of this state of things, during the last quarter of 1866, demands the earnest consideration of every one who has any regard for the moral,

The December quarter the most fatal to life.

Import of the fact that the deaths were more numerous than the births.

social, or even commercial prosperity of the borough. A natural decrease of population, is one of the surest signs of national decay. Nothing more distinctly points to the existence amongst us of some great moral or physical evil, of which it is equally the duty of rulers and people to seek the removal; for physical wretchedness is no less the enemy of morality and religion than of health.

In October the mortality still continued to increase.

In October, the death rate was 36·2 per thousand. During the fortnight ending the 13th October, the deaths were 174, or 44 above the corrected average fortnightly number; 95, or 54 per cent. were of children below five years of age. The line representing diarrhoea and cholera rose to 20, being its highest point for the year. Typhus rose from 8 to 12. Diseases of the respiratory system rose from 12 to 18, while deaths from tubercular diseases fell from 21 to 17. Scarlatina stood at 42. In the following two weeks, ending October 27, the deaths from scarlatina rose to 49, or 28 per cent. of the total number of deaths, which was 171, being 41 above the corrected average fortnightly number. Typhus gave 8, and there were also 8 certificates for cholera and choleraic diarrhoea. The mean temperature of the month was 52°, and the rain-fall below the average, although distributed over a good many days.

November showed no improvement of the public health.

For November, the death rate stood at 36·2. The death line for the first fortnight was borne upwards, by an increase of the deaths from diarrhoea and cholera from 8 to 17. Out of 178 deaths, not fewer than 103, or nearly 58 per cent., were of children under five. Scarlatina accounts for 50 of those deaths. During the next fortnight, the deaths from diarrhoea fell from 17 to 1, and those from tubercular diseases from 22 to 13. Under these influences the mortality of the fortnight fell from 178 to 162, and that of children from 103 to 84, although diseases of the respiratory system rose from 13 to 25, and scarlatina from 50 to 61, or 37 per cent. of the deaths from all causes. The mean temperature of the month was 42° Fahr., and the rain-fall above the average.

In December, the death-rate reached its highest point for the year.

December was, upon the whole, a drier and warmer month than November, the mean temperature being 44° Fahr.; and although typhus and diarrhoea were much below the average, the death rate was 37·2 per thousand, being the highest of any month in the year. Bronchitis and pneumonia, were less fatal than in November, but tubercular diseases were more fatal. Scarlatina reached a frightful eminence, the fortnight ending the 8th December showing 58 deaths, and the following two weeks no fewer than 71, or nearly 40 per cent. of the entire, and 80 per cent. of the infant, mortality. It largely took the place of other diseases that ordinarily sweep away our youthful population. Steadily advancing for nearly six months, it still showed no signs of abatement, and no limit to its progress among our crowded population, except non-susceptibility.

Frightful mortality from scarlatina.

In time it will exhaust itself, but only to give place to other diseases, which, though they may be less fatal, will still continue to keep our death rate above the average of other large towns, so long as our sanitary measures are not based upon an adequate knowledge of the causes of disease, and conducted upon a comprehensive plan. The fortnight of highest mortality during the year was that ending the 8th December, the deaths being 182, or 52 above the corrected fortnightly average number. For the week ending the 15th December, the death-rate was 41·4 per thousand, the highest point which it reached during the year, being at the annual rate of 1 in 24 persons living, a rate at which the entire population of Newcastle would be swept away in 24 years. For the week ending the 22nd December, the death rate was 34·1 per thousand, and the last week of the year 37·1. The year 1866 thus closed with a struggle between life and death, in which death seemed to have the mastery; the exterminating forces, generated by our unsanitary condition, being more powerful than the reproductive forces of society.

Scarletina took the place of other diseases fatal to children.

Deaths at the annual rate of 1 in 24, in the 2nd week of December.

The year closed with a struggle between life and death.

INFANT MORTALITY.

One of the most sensitive tests of the sanitary condition of a town is the rate of its infant mortality. Occupation, habits, passions, and vices do not obscure the statistics relating to the mortality of children as they do in the case of adults; while, on the other hand, their susceptible constitutions are more easily influenced by the various causes of disease. In Newcastle, during the past year, the mortality of children of six years and under was upwards of 49 per cent. of the whole. Out of 3950 deaths, no fewer than 1957 were of children below six years of age. This mortality among children is greatly found in the homes of the poor. From the Registrar General's reports it appears, that, while not a fifth of the children of the rich die before the fifth year, more than one-half of the children born in tenement property die before that period.

Infant mortality the most sensitive test of the sanitary condition of a town.

Out of 100 children born, there live and die respectively during the first five years, as under:—

		LIVE.		DIE.
In Norway	...	83	...	17
„ Denmark	...	80	...	20
„ England	...	74	...	26
„ Belgium	...	73	...	27
„ France...	...	71	...	29
„ Prussia	...	68	...	32
„ Holland	...	67	...	33
„ Austria...	...	64	...	36
„ Spain	...	64	...	36
„ Russia	...	62	...	38
„ Italy	...	61	...	39
„ Newcastle-on-Tyne	...	61	...	39

Comparison of infant mortality in Newcastle with that of other parts Europe.

The risk to an infant's life is greater in Newcastle than the average risk in most of European countries, and 13 per cent. above the average of England.

And with that of other parts of England.

A comparison of the Newcastle death-rate of 1866, under five years, with that of different parts of England, gives the following proportions to 1000 deaths:—

All England	...	...	...	...	266
Staffordshire	...	...	...	...	208
Leicestershire	...	...	...	...	262
Cheshire	...	...	...	...	271
East Riding	...	...	...	...	272
West Riding	...	...	...	...	287
Warwickshire	...	...	...	...	289
London...	...	...	...	...	298
Lancashire	...	...	...	...	336
Newcastle-on-Tyne	...	...	...	...	467

Table, showing the age at death, in each of the registration sub-districts of Newcastle-upon-Tyne, in 1866.

The average age of persons who died in Newcastle during 1866.

	St. Nicholas	All Saints	St. Andrew	Westgate	Byker	Total
6 years & under	216	571	245	719	206	1957
6 " " 20	62	84	50	109	34	339
20 " " 40	154	106	51	179	50	540
40 " " 60	141	127	50	159	51	528
60 " & above	107	114	90	222	53	586
	680	1002	486	1388	394	3950

The average age of those who died during 1866, was in St. Andrews $24\frac{1}{2}$ years, in Westgate $23\frac{1}{2}$ years, in Byker $22\frac{1}{4}$, in All Saints $20\frac{1}{4}$, the average of the whole town being 24 years. Westgate has to be corrected for the Workhouse, where there are about 300 children, collected from every district of the Union. But the comparison between the other sub-districts named is accurate enough. The mean value of life, as Dr. Farr has shown, can only be ascertained with precision, by knowing the ages of those who are living, as well as the ages of those who die. Hence the comparative inaccuracy of the Northampton life-tables. But the fact that, out of 3950 deaths, 2296, or 58 per cent. were of persons who had not reached their majority; and if the 40th year may be regarded as the period when the brain attains its highest development, the fact that no fewer than 2836 persons, or 71 per cent., died before reaching the maturity of their intellectual powers, must be regarded as of startling significance.

58 per cent. died in 1866 before reaching 21 years of age.

Table, showing the deaths of children below five years of age, in each of the registration sub-districts of Newcastle-upon-Tyne, in 1866.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	TOTALS.	Proportion to 1000 deaths.
St. Nicholas -	13	19	22	10	13	6	17	19	19	23	32	21	214	315
All Saints -	30	35	44	35	33	28	40	42	68	52	60	67	534	534
St. Andrew -	15	11	24	14	9	10	11	20	31	29	16	32	222	455
Westgate -	50	56	63	37	39	34	46	56	91	51	63	88	674	485
Byker -	12	13	16	17	17	12	7	18	23	25	16	27	203	513
Borough -	120	134	169	113	111	90	121	155	232	180	187	235	1847	467

Infant mortality greatest in those sub-districts where sanitary evils are greatest in number and intensity.

The greatest infant mortality during the past year was in All Saints, where there was the greatest accumulation of sanitary wrongs; the deaths of children under five years of age forming 53·4 per cent. of the deaths from all causes, or nearly 7 per cent. above the average for the borough, and 5 per cent. above the infantile ratio of Liverpool, where, during 1866, the infantile deaths were 48·4 per cent. of the whole. Byker sub-district stands next to All Saints, 51·3 per cent. of its entire mortality consisting of the deaths of children below five. Westgate sub-district, in its infant mortality, is above the average of the borough, although its deaths from scarlatina are below the average. The fact is explained by an excess of infantile diarrhœa, dependent largely upon the fermentation of organic matter going on during the summer months in its miles of unpaved streets, and large middens; nor must the 300 Workhouse children be forgotten. The number of deaths under five years in St. Andrews' sub-district is 45·5 per cent. St. Nicholas shows a relatively low infant death-rate, only 31·5 per thousand; but this is because the 214 deaths of children below five are compared with the high adult mortality in that sub-district, from the deaths in the Infirmary and Fever House. When the correction is made for those deaths, the infant death-rate of St. Nicholas is 41·0 per cent. of the deaths at all ages.

Mortality of children under five, greatest in All Saints, being 53·4 per cent., Byker 51·3 per cent.

In Westgate 48·3 per cent.

St. Andrews 45·5 per cent., and

St. Nicholas 41·0 per cent. of the deaths at all ages.

THE DISEASES MOST FATAL TO THE YOUNG.

The diseases that have been most fatal to children are scarlatina, convulsions, atrophy, measles, whooping cough, diarrhœa, phthisis, hydrocephalus, bronchitis, and pneumonia. 232 deaths are returned from convulsions alone, a result largely dependent on the poisoning of the atmosphere which results from overcrowding. The connection of convulsions with impure air will be best understood by considering a fact

Convulsions largely dependent on a vitiated atmosphere produced by overcrowding.

Remarkable
experience of
Dublin Lying-
in Hospital.

stated on the authority of Mr. Simon. "It consists in the remarkable experience of the Dublin Lying-in Hospital, as told by Dr. Collins, formerly master of the institution seventy-four years ago. This experience was to the effect, that of 17,650 children born in the institution, 2944 had died within the first fortnight, being about 17 per 100 on the births, and that nearly all these deaths, 19 out of every 20, had been occasioned by 'nine-day fits.' Dr. Clarke, who at that time was master, considered a foul and vitiated state of the air of the wards to be the principal cause of this disease, and adopted arrangements by which a free circulation of air was at all times secured through the wards, and effected in such a way as to put it out of the power of the nurses to control it. Of 8,033 children born subsequently to the wards being ventilated, only 419 died, being about $5\frac{1}{2}$ per 100 on the births, or less than a third part of the previous mortality. Under additional improvements, the death-rate became still further reduced.

Convulsions, to a
great extent
prevented by
better ventila-
tion.

Among 16,564 infants born during the seven years of Dr. Collin's mastership, only 286 died (being about 1.7 per 100) and of these only 37 from convulsions; so that within fifty years of Dr. Clarke's reform, the general mortality had been reduced to one-tenth of what it was, and the special mortality to one-sixty-eighth." The contamination of the atmosphere which results from over-crowding, is not only a circumstance eminently favourable to the diffusion of miasmatic diseases, but to the deterioration of race. To quote Mr. Simon:—

A high local
mortality of
children proves
generally the
prevalence of
causes which
lead to a
degeneration
of race.

"Those places where infants are most apt to die are necessarily the places where survivors are apt to be most sickly, and where, if they struggle through a scrofulous childhood to realize an abortive puberty, they beget a still sicklier brood than themselves, even less capable of labour, and even less susceptible of education. It cannot be too distinctly recognized that a high local mortality of children must almost necessarily denote a high local prevalence of those causes which determine a degeneration of race." For the future, then, as well as for the present, humanity would have us to spare no exertion to reach the causes of our high death-rate.

Order of fatality
from convul-
sions in the five
registration
sub-districts.

The deaths from convulsions during 1866, were greatly above the average of England, being as 190 to 131 in 100,000; while the relative numbers in each of the registration sub-districts were, in All Saints 285, St. Nicholas and St. John 209, Westgate and Elswick 180, St. Andrew 158, and Byker 112, to 100,000 persons living. In the order of fatality among specified diseases, in Newcastle, convulsions stand fifth for last year, accounting for 58 in a thousand deaths; while in All Saints they account for 72, Westgate 59, St. Andrew 57, St. Nicholas 51, and Byker 38, in 1000 deaths from all causes.

CAUSES OF INFANT MORTALITY.

It cannot be doubted that to the over-crowded state of the dwellings of the poor must be charged much of the deadly destruction of the past year. There is no period of human existence, at which a free supply of oxygen is of greater consequence, healthily to carry on the vital functions, than infancy: and none when the impure air of crowded, badly-ventilated, and badly-drained dwellings, is so inimical to life. Each busy cell in the child's growing organism, requires its supply of oxygen, and if that fails, becomes a source of death rather than of life. Air is more important than food, because food is only required at considerable intervals, while air must be had every few seconds. We do not see it, do not taste and handle it, do not pay an air-rate, therefore it is not much valued. Especially during the hours of sleep is it needful to have an abundant supply of fresh, pure air; and yet, as a rule, the smallest, lowest-roofed, worst-ventilated rooms are used for sleeping in. Human life is sacrificed to show, fashion, or false economy. Ignorance of the simplest laws entails a heavy penalty; and the children in our schools should be taught that the air expired by animals is hurtful and poisonous.

Want of a sufficient supply of oxygen, a fruitful cause of infant mortality.

Many children die of want, and that not only in the homes of the poor. There may be starvation in the midst of plenty, if their young organisms do not get the food, which they need, and can assimilate. In country places, the pigs often get the milk which should find its way to our large towns, to nourish the famishing children.

Want of proper food.

Excessive, or injudicious feeding, is another cause of infant mortality. There are nurses that seem to think that the way to make a child strong is to cram as much food into its stomach as possible. The powers of digestion are thus destroyed, and the frail body is exhausted by its constant efforts to dispose of the excessive supply. Food is given to the child, without any regularity or regard to its real wants. Every time it cries, is the signal for a new attempt at feeding. Regularity and system, so necessary to the child's comfort and health, are at an end; and under the ignorant care of Meddle and Muddle, unless its constitution is vigorous enough to repel the interference, it is slowly poisoned.

Excessive injudicious, and irregular feeding.

The frightful mortality from abdominal diseases among children, partly depends upon fruitless sucking, another pernicious habit formed by giving the child a teat to suck, with the object of keeping it quiet. That instinctive act, so perfect from the first, and so admirably adapted for the sustenance of the young being, when prostituted by its nurse to the love of ease, becomes a source of disease and death. Dr. Wilde, in his work on the Institutions of Austria, gives a table of the mortality in the Vienna Foundling Hospital,

Fruitless sucking.

Pernicious
influence of
the sugar teat.

extending over a period of fifty years. It ranges from 95 to 30 per cent.; abdominal disorders constituting the principal part of this excessive mortality. Experiments were tried with various kinds of food, and every means employed to check it, but in vain. The subtle cause of the mischief was not detected. "Every infant admitted to the hospital, no matter whether it is suckled by its parent or not, is supplied with a sugar teat, formed by tying up some bread and sugar in a piece of rag, which is then placed in the child's mouth for it to suck." This kept the hospital quiet, but it killed the children. The child cannot cry when it is sucking; and the teat in the nurse's pocket is a ready means of obtaining peace, but at the expense of health.

Neglect of
children

Many widows are obliged, in endeavouring to earn a living, to leave their children to the care of persons who have little or no knowledge, while others prefer to earn money abroad, rather than tend their infants at home. Under such circumstances, all the evils of imperfect rearing and neglect become rank, and supplemented by "Dalby," "Godfrey," other opiates, and quack medicine, it cannot be matter of surprise that many of the children die. Kindness to one another amongst the poor, during sickness, is a beautiful, and, happily, a common characteristic, but kindness does not constitute, and will not always secure, efficient nursing.

and drugging.

A suggestion has been made, that in the improved dwellings, proposed to be erected by the Corporation, provision should be made for a public nursery, and though, like all other institutions of a similar nature, somewhat endangering habits of self-help, it might, under proper regulation, be made useful in teaching young women to nurse, and in providing for young children in the temporary absence of their mothers.

Want of
education and
intelligence.

It has been observed that where education is low, infant mortality is the greatest; and an education that ignores the duties of parents to children, arising out of the simplest physiological truths, is little better than none. London, which suffers from many sanitary disadvantages, has an infantile death-rate only slightly above the average of all England; but it has a population, which for intelligence is considerably above the average. If we take the signing of the marriage register as indicating, in any measure, the fitness of the women who are married for the duties which they have to perform, we find that the marriage register is signed by 64 per cent. in England and 81 per cent. in London.

Other causes of
infant
mortality.

Intemperance, improvidence, reckless marriages, hereditary taint, want of cleanliness, exposure to cold, insufficient clothing, inefficient medical aid, have all an influence in swelling the lists of youthful mortality; and the analysis of the general death-rate will reveal causes more or less operative in that direction. But the whole question is one so deeply involving the future, that it requires, for its satisfactory

elucidation, the thorough investigation of an officer of health; and where so much of the public money is wisely spent in the cure of disease, it may not be deemed extravagant to devote a small part of our corporate resources to the still nobler task of its prevention.

Arising from so many causes, it is not to be expected that any specific can be found for our high infant mortality. The effects of every sanitary improvement will first be felt among our youthful population, and for the rest we must rely mostly upon the increase of education, the diffusion of intelligence, and the deepening of those religious convictions and feelings, which so largely stimulate parents to the faithful discharge of the higher duties of life.

How to diminish the high infant death-rate.

THE PRINCIPAL CAUSES OF DEATH.

A study of the principal causes of death for the past year shows how much of the mortality may be regarded as preventible. Scarlatina accounts for 500 deaths, or 12·65 per cent. of the whole; phthisis 400, or 10·12 per cent.; atrophy and debility 363, or 9·18 per cent.; bronchitis 387, or 7·26 per cent.; convulsions 232, or 5·86 per cent.; typhus 224, or 5·65 per cent. These six diseases account for 2006 deaths, or 50·74 per cent. of the entire mortality; while only 196 or 4·95 per cent. died of old age. Amid the pestiferous influences of our town life, very few persons reach the full measure of their days. *Tabes mesenterica* accounts for 172 deaths, or 4·35 per cent.; heart disease 144, or 3·64 per cent.; pneumonia 135, or 3·4 per cent.; diarrhoea 123, or 3·11 per cent.; accident or negligence 115, or 2·9 per cent.; measles 105, or 2·65 per cent.; ulceration of intestines 104, or 2·63 per cent. Whether we regard the ages at which the deaths took place, the nature of the diseases that proved fatal, or the sanitary conditions in which they proved fatal, it is impossible to resist the conviction that much of the mortality which we have to deplore during the past year sprang from causes under human control. The deaths of children below five, were in excess by 795, or 40 per cent. above the average of England. Out of every 100 deaths in England, 26 are of children under five, while the proportion for Newcastle, in 1866, was 46 in 100. Amid the evidences of sanitary neglect, abounding on all sides, to say that this frightful mortality is all a mystery, may serve as an excuse for apathy and neglect, but it cannot rid us of our responsibility. Until, as a community, we have strained every nerve to remove from our midst, every known cause of disease and death, we must take no consolation in the decrees of Providence. Leprosy and ague are now, in this country, all but extinct, having yielded to drainage and better modes of living. Typhus has been driven from our prisons and common lodging-houses. Why should it not be driven from the homes of the people?

Six diseases account for fully one-half of the entire mortality of 1866.

Other causes accounting for 22·68 per cent.

Much of the mortality of 1866 must be regarded as preventible.

Table, showing the principal causes of death in Newcastle, in the year 1866, arranged in the order of mortality.

CAUSES OF DEATH.	No. of deaths registered in Newcastle, in the year 1866.	Proportional number from each cause to 1000 deaths from all causes.	St. Nicholas and St. John.		All Saints.		St. Andrew.		Westgate and Eswick.		Byker.	
			No. of deaths registered in 1866.	Prop. to 1000 deaths from all causes.	No. of deaths registered in 1866.	Prop. to 1000 deaths from all causes.	No. of deaths registered in 1866.	Prop. to 1000 deaths from all causes.	No. of deaths registered in 1866.	Prop. to 1000 deaths from all causes.	No. of deaths registered in 1866.	Prop. to 1000 deaths from all causes.
1 Scarlatina	500	126.50	44	53.68	166	166	84	172.78	153	110.16	55	134.62
2 Phthisis	400	101.20	85	124.95	74	74	55	113.13	149	107.28	37	93.98
3 Atrophy and Debility	363	91.83	40	58.80	77	77	36	74.05	162	116.64	4	111.92
4 Bronchitis	287	72.61	43	63.21	82	82	43	88.45	102	73.44	17	43.18
5 Convulsions	232	58.69	35	51.35	72	72	28	57.59	82	59.04	15	38.10
6 Typhus	224	56.57	*24	35.28	116	116	14	28.79	34	25.16	36	91.44
7 Old Age	196	49.58	38	55.86	33	33	15	30.84	84	60.52	26	66.04
8 Tabes Mesenterica	172	43.51	22	32.34	57	57	23	47.31	44	32.56	26	66.04
9 Heart Disease	144	36.43	23	33.81	37	37	24	49.36	47	31.79	13	33.02
10 Pneumonia	135	34.15	19	17.93	25	25	16	32.91	54	39.96	21	53.34
11 Diarrhoea	123	31.11	7	10.29	26	26	13	26.84	68	48.96	9	22.86
12 Accident or Negligence ..	115	29.08	55	80.85	28	28	5	10.28	18	13.32	9	22.86
13 Measles	105	26.56	7	10.29	34	34	15	30.85	38	28.12	11	27.94
14 Ulceration of Intestines ..	104	26.31	27	39.69	14	14	25	51.42	29	21.46	9	22.86
15 Affection of Brain	80	20.24	9	13.23	20	20	13	26.74	27	19.44	11	27.94
16 Paralysis	67	16.85	18	26.46	10	10	8	16.44	26	18.72	5	12.70
17 Dropsy	59	14.72	9	13.23	16	16	4	8.22	24	17.28	6	15.24
18 Whooping Cough	59	14.72	7	10.29	10	10	4	8.22	29	21.46	9	22.86
19 Hydrocephalus	52	13.15	8	11.76	15	15	7	14.39	18	12.96	4	9.16
20 Cholera & Choleraic diarrh.	51	12.80	2	2.94	23	23	4	8.22	18	12.96	4	10.16
21 Liver disease	46	11.63	10	14.70	9	9	4	8.22	17	12.24	6	15.24
22 Apoplexy	44	11.13	11	16.17	8	8	9	18.51	14	10.08	2	5.08
23 Lung disease, &c.	37	9.36	4	5.88	5	5	3	6.17	19	13.68	6	15.24
24 Kidney disease	26	6.57	8	11.76	5	5	4	8.22	8	5.76	1	2.54
25 Stomach disease	20	5.06	2	2.94	4	4	3	4.17	8	5.76	3	7.62
26 Cancer	20	5.06	5	7.35	2	2	1	2.05	11	7.92	1	2.54
27 Asthma	17	4.30	0	...	5	5	3	6.17	8	5.76	1	2.54
28 Syphilis	15	3.79	2	2.91	4	4	..	..	7	5.04	2	5.08
29 Alcoholism	13	3.28	4	5.88	4	4	1	2.05	4	2.88	..	..
30 Epilepsy	12	3.03	2	2.94	1	1	3	6.17	5	3.60	1	2.54

* The deaths from Typhus in Fever House are distributed among the districts whence the cases came.

Under the 30 causes named, the table accounts for 3718 of the 3950 deaths during 1866. It further shows how widely, in some instances, the proportional number from each cause to 1000 deaths from all causes, differs in each of the registration sub-districts. In St. Nicholas and St. John, phthisis was the most fatal of all diseases, accounting for 12.49 per cent. of the whole. Accident or negligence stands next, in the relation of 8.08 per cent. to the total mortality. The excessive mortality from those causes is explained by the fact that the Infirmary is situated in this sub-district. Bronchitis accounts for 6.32, atrophy and debility 5.88, scarlatina 5.36, convulsions 5.13, ulceration of the intestines 3.96, typhus 3.52, heart disease 3.38, and tabes mesenterica 3.23 per cent. of the whole. In All Saints, scarlatina was the most fatal disease during 1866, accounting for 16.6 per cent. of the entire mortality; next to it was typhus, showing

Principal causes
of death in St.
Nicholas and
St. John.

All Saints.

11·6 per cent.; third, bronchitis, 8·2; fourth, atrophy and debility, 7·7; fifth, convulsions, 7·2; sixth, phthisis, 7·4; seventh, tabes mesenterica, 5·7 per cent. of deaths from all causes. In St. Andrew, scarlatina was also the most fatal disease of the year, accounting for 17·2 per cent.; then, phthisis, 11·3; next, bronchitis, 8·8; fourth, atrophy and debility, 7·4; fifth, convulsions, 5·7; sixth, heart disease, 4·93; and seventh, tabes mesenterica, 4·73 per cent. of the entire mortality for the year. In Westgate and Elswick, the order of mortality is quite different: at the head of the causes of death stands atrophy and debility, accounting for 11·6 per cent.; scarlatina is second, with a relative death-rate of 11 per cent.; then follows phthisis, which accounts for 10·7 per cent.; fourth, bronchitis, accounting for 7·3 per cent.; fifth, old age, 6·0 per cent.; sixth, convulsions, 5·9; and seventh, diarrhoea, 4·8. In Byker, the order of fatality was (1) scarlatina, accounting for 13·4; (2) atrophy and debility, 11·1; (3) phthisis, 9·3; (4) typhus, 9·1; (5) old age, 6·6; (6) tabes mesenterica, 6·6; (7) pneumonia, 5·3 per cent. from all causes. It will be observed that typhus takes rank among the first seven causes of mortality only in the All Saints and Byker sub-districts; old age in St. Nicholas, Westgate, and Byker; heart disease in St. Nicholas and St. Andrew; and diarrhoea only in Westgate.

Principal causes
of death in St.
Andrew,

Westgate and
Elswick,

and Byker.

SPECIFIED CAUSES OF DEATH.

It has already been ascertained that the mortality in Newcastle, during the past year, in each of the classes, and most of the orders of disease, has been considerably in excess of the mean annual mortality of England. A comparison of the deaths, under the distinct heads of disease, shows that, in almost every instance, the death-rate is above the average of the whole country. The only exceptions, indeed, among the principal causes of disease are those of whooping cough and croup, which caused 59 deaths, or at the rate of 48 in 100,000 persons living, being 29 less than the average; and pneumonia, which was 14 below the mean annual mortality of England, or in the population of 110 to 124. Scarlatina was above the average, being at the ratio of 409 to 106 in 100,000 persons living; consumption, as 327 to 267; atrophy and debility, as 297 to 104; bronchitis, as 235 to 124; convulsions, as 190 to 131; typhus, as 183 to 91; tabes mesenterica, as 140 to 26; diarrhoea, as 100 to 80; measles, as 86 to 43; and ulceration of the intestines, as 85 to 4. On a comparison of the sub-districts the most suggestive facts are the excessive mortality in All Saints from typhus, scarlatina, tabes mesenterica, convulsions, and bronchitis; in St. Nicholas and St. John from ulceration of intestines and convulsions; in Byker from atrophy and debility, pneumonia, and tabes mesenterica; in St. Andrew from scarlatina, ulcer-

The deaths from
scarlatina,
phthisis, atro-
phy and de-
bility, bron-
chitis, convul-
sions, typhus,
tabes mesen-
terica, diarr-
hoea, measles
and ulceration
greatly above
the average of
England.

ation of intestines, and bronchitis; and in Westgate from atrophy, consumption, and diarrhoea.

Comparison of the deaths from specified causes in each of the Registration sub-districts with the average for the whole borough,

Table, showing the proportion of deaths from specified causes in Newcastle-upon-Tyne during 1866, compared with the average of England for the Fifteen years, 1850-64. Deaths per 100,000 living of each class referred to.

	All cases.	Zymotic cases.	Measles.	Scarlatina.	Whooping Cough & Croup.	Typhus.	Diarrhoea.	Tubercles Mesenterica.	Phthisis.	Convulsions.	Bronchitis.	Pneumonia.	Ulceration of intestines.	Atrophy and Debility.	Hydrocephalus.
England	2219	506	43	106	77	91	780	26	267	131	134	124	4	104	39
Newcastle-on-Tyne.....	3237	932	86	409	48	183	100	140	327	190	235	110	85	297	42
St. Nicholas & St. John (Fever Hospital) }	4071	1023	41	263	41	514	41	131	508	209	257	113	161	239	47
All Saints	3491	1219	118	578	34	268	90	198	257	250	235	87	48	268	52
Byker	2962	842	82	398	67	165	67	195	278	112	127	157	67	360	30
Westgate & Elswick (Workhouse) ... }	3050	816	83	336	63	61	149	96	327	180	224	118	63	356	39
St. Andrew.....	2745	768	84	474	22	62	73	129	310	158	242	90	141	203	39

DEATHS FROM ZYMOTIC DISEASES.

The zymotic death-rate in Newcastle above the average of England.

An analysis of the returns furnished by the Sub-Registrars, shows that of 3950 deaths during the past year, 1145 or 29 per cent. are attributed to diseases of the zymotic class; the average for the whole country, for a long series of years, being less than 23 per cent. of the whole. The deaths ascribed to zymotic diseases are probably below the true number, for many of the certificates of death only name the secondary cause, and equally ignore diathesis and previous disease. Of the 1145 deaths from zymotics, 1114 belong to the miasmatic, 15 to the enthetic, and 16 to the dietic orders. The following table arranged in the order of their fatality shows the deaths from zymotic diseases during 1866.—

ORDER I.—MIASMATIC DISEASES.

Diseases of the zymotic class arranged in the order of their fatality in Newcastle, during 1866.

Scarlatina ...	500	Influenza ...	17
Typhus ...	203	Erysipelas ...	14
Diarrhoea ...	123	Diphtheria ...	7
Measles ...	105	Small Pox ...	6
Whooping Cough ..	59	Rheumatism ...	4
Choleraic Diarrhoea	31	Dysentery ...	3
Typhoid Fever ...	21	Carbuncle ...	1
Cholera ...	20		
	1062		1114

ORDER II.—ENTHETIC DISEASES.

Syphilis	...	...	...	...	15
					15

ORDER III.—DIETIC DISEASES.

Purpura and Scurvy...	...	...	...	...	3
Alcoholism	...	...	...	...	13
					16
					1145

ENTHETIC DISEASES.

The 15 deaths placed under the head of enthetic diseases, but faintly point to a not inconsiderable cause of the enervation, which too widely prevails in our populous towns. They are in excess of the average of England, as 12 is to 5. Death, rarely resulting, either from the directly contracted or inherited form, our registers of mortality throw but little light on the extent to which this contaminating and baneful disorder is disseminated. Even the records of our public institutions fail to give a complete view of its effects upon the public health. It is at least doubtful, whether the Continental system of dealing with the evil, does not create greater mischief than it prevents. The "Contagious Diseases Prevention Act" is one which the legislature intended to be exceptional and limited in its operation, and which it will hesitate to apply to the country generally. The elevation of the moral tone of society, and the more careful training of the young, are almost the only means in operation tending to the suppression of the contagion; but so permanent is the brand which it too often leaves on the constitution, and so great the peril with which it surrounds the future vigour of our race, that it becomes matter of grave consideration, whether more cannot be done to conquer a foe as insidious as it is terrible.

An enthetic disease that tends to produce permanent physical degradation and deterioration of race.

DIETIC DISEASES.

Dietic diseases have been fatal during the past year to 16 persons; this return, however, gives but a faint indication of the extent to which the diseases of this order influence mortality. Not a single death is returned as from want of breast milk, and yet it cannot be doubted that artificial feeding, by producing debility, difficult teething, and impaired general health, has contributed to the high infant death-rate of 1866. French statistics furnish us with striking proof of the effects of the natural mode of bringing up infants, as compared with that of bringing them up by hand. The results of the two systems, as followed in three of the principal foundling hospitals in France, have been compared by M. Villermé, one of the most distinguished statisticians of that country.* At

Want of breast-milk, a more frequent cause of death than appears in the sub-registrar's returns.

* See Dr. West on the Diseases of Infancy and Childhood, p.

Evil effects of
artificial
feeding as
shown in
French
statistics.

Lyons, each infant, at its reception, is given into the charge of a wet-nurse, and its stay in the hospice does not exceed a very few days, after which it is sent to be nursed in the country. At Rheims, the stay of the infant in the hospice is equally short; but neither while there, nor afterwards when at nurse in the country, is it brought up at the breast. At Paris, the stay of the children in the hospice is often very much longer; but they are usually, though not invariably suckled by wet-nurses. The mortality under one year of the children admitted into these institutions is:—

At Lyons	...	...	...	33·7 per cent.
“ Paris	...	...	...	50·3 “
“ Rheims	...	...	...	63·9 “

Only a mother
can efficiently
perform a
mother's part.

Want of milk a
probable cause
of the high
infantile
mortality of
1866.

Although most of this excessive mortality is due to artificial feeding, part of it is doubtless owing to a system which too much prevails in France, that of the mothers delegating to a stranger those other maternal duties which nature requires her to perform. While among children suckled by their mothers, only 18·36 per cent. die within a year of their birth; 29 per cent. of those put out to wet-nurse die within the same period. The natural food for an infant is mother's milk; but when, from the mother's neglect to perform towards it a mother's part; or when from accident, disease, or death, it is deprived of the food which nature destined for it, the artificial food on which it has to depend ought to contain all the elements necessary for the child's growth and warmth, and in such a form that it can digest and assimilate them. The farinaceous articles of food, which are so often selected, on account of their supposed lightness, do not fulfil all these conditions; and milk, which does fulfil them, is too often adulterated. The quantity of milk to each person in Ireland is 135 ounces per week; in Scotland 124 $\frac{3}{4}$ ounces; in Wales 85 ounces; and in England 32 ounces; but the average quantity to each person in Newcastle is much less. The scarcity of milk, which prevailed during the cattle plague, has probably contributed to increase the deaths from atrophy and debility, which in very young children so often result from the want of food. It cannot be too widely known that skimmed and butter milk contain as much of the nitrogenous element or flesh-forming principle as new milk, and are the best and cheapest substitutes which a poor family can find for beef and mutton.

DEATHS FROM ALCOHOLISM.

Poisoning by
alcohol.

Fifteen of the deaths under the head of dietetic diseases are attributed to alcoholism, which, as compared with the average number of deaths for England from the same cause, is three times greater, or as 12 to 4 in 100,000 living. The cumulative effects of long-continued intemperance have been traced in morbid changes in the nervous centres, the respiratory organs,

the liver, the heart and large arteries, the kidneys, and the alimentary canal.* It is only the results, however, that appear in the registrar's returns. The fifteen deaths attributed to alcoholism were mainly due to the complete poisoning of the nervous centres, which produces the disease variously known as the brain fever of drunkards, dipsomania, or delirium tremens. But the more chronic influences of these toxic agents upon the blood, the brain, and the nervous system are nowhere to be traced in the bills of mortality. Yet it cannot be doubted that chronic alcoholism is one of the most powerful determining causes of the physical degeneration of the individual and the race.† Of 26,695 English soldiers in Bengal, the per centage belonging to the temperance society, daily in hospital for one-half year, was 2·65; of other soldiers, 10·20.‡ The subjects of intemperance whose employment is sedentary and confined, fare worse than those who labour under an open sky. The nervous temperament of women renders them more susceptible to the action of toxic agents, and when mothers become addicted to spirit drinking, we may expect more disease, and greater mortality among their children.

Chronic alcoholism a powerful cause of the physical degeneration of the individual and the race.

Women and children likely to suffer most.

MIASMATIC DISEASES.

Of all the orders of disease, there was none so fatal in Newcastle, during 1866, as the miasmatic. The diseases of this order caused 28 per cent. of the entire mortality. The poisons, or miasms that have been most prevalent during the past year, were those that seem to be propagated through the medium of infected air, or of contaminated persons, rather than those which appear to depend for their dissemination upon the contamination of water or of food. The average annual rate of mortality from miasmatic diseases in England, from 1851 to 1863, was 4·8 per thousand, and in London, 5·8 per thousand, while in Newcastle, for the past year, it was 9·0 per thousand.

The miasms most prevalent in Newcastle during 1866, those which are propagated through medium of infected air or contact.

The proportion of deaths from miasmatic diseases to 100,000 persons living in All Saints, was 1194; St. Nicholas, 964; Byker, 823; Westgate, 795; and St. Andrew, 768. Of the deaths from miasmatic diseases, scarlatina accounts for 45 per cent.; typhus, 18 per cent.; diarrhoea, 11 per cent.; measles, 9 per cent.; whooping cough, 5 per cent.; cholera and choleraic diarrhoea, 5 per cent.; typhoid fever, 2 per cent.; influenza, 1·6 per cent.; erysipelas, 1·3 per cent.; and diphtheria, small-pox, rheumatism, dysentery, and carbuncle together, the remaining 2·1 per cent. The foul air and filth produced by overcrowding, are the predisposing causes of the prevalence and fatality of miasmatic diseases.

*Dr. Aitken's Science and Practice of Medicine, vol. 2, p. 39.

†Ibid, vol. 1, p. 139.

‡See Dr. Parkes, on Hygiene.

MEASLES.

9·3 per cent. of
the mortality
from measles
of children
under five.

More infectious
but less fatal
than scarlatina

Evidence of
contagion.

Wide diffusion
of poison.

The number of deaths from measles during the past year was 105, being double the average for England for the last fifteen years. In 100,000 persons living, there were 86 deaths in Newcastle from measles, as against 43 for England. Above 90 per cent. of these deaths were of children under five years old, and only one death above the age of ten. Even more than scarlatina, measles is a disease of early childhood; 99 per cent. of the deaths occurring under the age of ten, and 93 per cent. under five. It is more infectious, but less fatal than scarlatina. Fewer persons pass through life without having experienced its attacks than of those who escape scarlatina, and yet fewer succumb. The average mortality from measles does not exceed 3 per cent. of the patients attacked by it. At least 3500 children in Newcastle must have had measles during the past year. Although it is not always possible to trace the contagion, it can scarcely be doubted that in every case it has been communicated through some medium or other. Facts such as the absence of the disease for the period of thirty years from the Cape of Good Hope,* and its development after the arrival there of a vessel from Europe, in which several cases had occurred during the voyage, substantiate the correctness of this opinion. The strongest proof of it, however, is afforded by the circumstances in which measles prevailed in the Feroe Islands, in 1846,† after an interval of sixty-five years. They were then introduced into one of these islands by a workman, who leaving Copenhagen on March 20th, reached the Feroe Islands on the 28th, apparently in good health, but fell ill with measles on April 1st. His two most intimate friends were next attacked; and from that time the disease could be traced from hamlet to hamlet, and from island to island, until 6000 out of a total population of 7782, had been attacked by it; age bringing with it no immunity from the contagion, though the disease was found to spare all who in their childhood had suffered from it at the time of the previous epidemic. It is probable, then, that the extreme contagiousness of measles is the reason of its greater prevalence, and that it is so peculiarly a disease of early life, not so much on account of any special susceptibility to it then, as because the subtle poison is so widely diffused as to leave little chance of any escaping it.‡ Unsanitary conditions favour the spread of the poison and its fatality. To the excessive overcrowding of tenements and the general insalubrity of the town, must be attributed the fact that the poison killed twice as many children as it would have done under healthier circumstances.

* Mentioned by Dr. Copland, in his Dictionary; art., "Measles," vol. ii., p. 822.

† Of which an account, by the Commissioner from the Danish Government, Dr. Pannum, is given in the Archives Gén. de Méd., April, 1851.

‡ Dr. West on the Diseases of Infancy and Childhood, p. 770.

Table, showing the number of deaths from Measles in each of the months of 1866, according to registration sub-districts.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	TOTAL.	Deaths to 100,000 living.
All Saints.....	2	6	1	...	7	2	2	4	5	2	1	2	34	118
St. Andrew ...	5	2	3	...	...	...	...	1	1	...	3	...	15	84
Byker	2	2	...	...	1	...	1	2	2	...	1	...	11	82
Westgate & Elswick... }	6	5	3	2	1	...	...	2	6	3	5	5	38	83
St. Nicholas & St. John }	2	...	1	2	...	...	1	...	...	...	1	...	7	41
TOTALS ..	17	15	8	4	9	2	4	9	14	5	11	7	105	86

June and July, the months of lowest mortality from measles.

The mortality from measles was lowest in the months of June and July. Overcrowding seems to have been as favourable to its diffusion and fatality, as in the case of scarlatina. Out of 100,000 persons living in All Saints, 118 died of measles; in St. Andrews, 84; in Westgate and Elswick, 83; in Byker, 82; and in St. Nicholas and St. John, 41; or rather below the average of England for fifteen years, which was 43 in 100,000 persons living. This low relative mortality from measles in the sub-district of St. Nicholas and St. John, is probably explained by the fact that most of those susceptible had been previously attacked.

Order of fatality, the same as in scarlatina, and apparently dependent on overcrowding.

SCARLATINA.

Scarlatina has been more fatal in Newcastle during 1866, than any other single disease, having caused 12.65 per cent. of the entire mortality.

Scarlatina the most fatal disease of 1866.

Table, showing the number of deaths from Scarlatina, in the county of Northumberland, including those of Newcastle-upon-Tyne, for each of the years 1850-64.

	1850	1851	1852	1853	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864
Northumberland.	186	151	699	358	148	249	543	303	334	164	480	768	356	235	140

The deaths from scarlatina in Newcastle, have been in excess of those from the same disease in the entire county every year since 1850, except 1852, 1856, and 1861. For

Its varying intensity, prevalence, and fatality.

Rise and progress of the epidemic.

months it disappears almost entirely, to break out again with fresh violence. It seems to move in cycles, becoming epidemic every five or six years. Its characters are as variable as its prevalence. At one time the scarlatina poison is so weak that it scarcely affects the system, or interrupts the child's cheerfulness even for a day; at another, so intense and deadly, that life is destroyed in a few days, or even in a few hours. To distinguish its varying intensity, the disease is subdivided into different varieties; but there is no reason to suppose that the *materies morbi* is in any case different. In the second week of June, it became epidemic, and its rise and progress to the last week in the year, were uninterruptedly regular.

Table, showing the deaths from Scarlatina in each of the sub-registration districts, in Newcastle-upon-Tyne, in each of the months of 1866.

DISTRICT.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	TOTALS.	Deaths to 100,000 living.
All Saints...	1	4	...	...	...	1	...	5	26	34	49	46	166	578
St. Andrew..	1	...	...	...	...	1	...	2	20	20	9	31	84	474
Byker	...	...	...	...	1	1	...	3	6	15	13	14	53	398
Westgate & Elswick ...	...	1	2	...	...	6	6	15	28	11	29	55	153	336
St. Nicholas & St. John	2	...	...	...	...	...	2	1	4	11	11	13	44	263
Whole Boro'	4	5	2	...	1	9	8	26	84	91	111	159	500	409

Mortality from scarlatina nearly four times greater than the average for England.

Comparison of sub-districts.

The deaths from scarlatina were nearly four times more numerous than the average for England during the past fifteen years, that average being 106 to 100,000 persons living; while in Newcastle, during 1866, there were 409 deaths from scarlatina to 100,000 persons living. The only other diseases causing deaths, more in excess of the average for England, were *tabes mesenterica*, and ulceration of the intestines.

The registration sub-districts where scarlatina has been most prevalent and fatal, are those in which there have been the greatest dissemination and fatality of measles. To 10,000 persons living, the proportion of deaths from scarlatina in All Saints, has been 57; in St. Andrew, 47; in Byker, 39; in Westgate and Elswick, 33; and in St. Nicholas and St. John, 26.

In May, 1866, there were very few known foci of scarlatina contagion in the borough, and when we consider the great

mortality from the disease, and its after-effects on many constitutions, it is matter for grave reflection whether by careful isolation, and proper disinfection, it might not at that early stage have been arrested in its progress. It is difficult to estimate the number of cases of scarlatina during 1866, but it cannot have been much below 9000.

Probable number of cases.

In the first 24 weeks of the year, the deaths from scarlatina numbered 12. In the last 28 weeks they numbered 488. From the 15th March to the 9th of June, only one death from scarlatina is registered; for the fortnight ending the 23rd of June, 9 are registered; and the following table shows the fortnightly progress of the epidemic from that date to the close of the year.

21 deaths from scarlatina in the first half of 1866, 479 during its latter half.

FORTNIGHT ENDING												
June	July		August		Sept.			October.		November.		December.
23	7	21	4	18	1	15	29	13	27	10	24	8 22 ..
9	3	5	9	17	22	20	42	42	49	50	61	58 71 ...

In the first fortnight of its being epidemic, 6 of the fatal cases occurred in the Westgate district; and in the course of 8 weeks it seems gradually to have spread over the whole area of the borough.

A map of the 500 deaths from scarlatina, dotted red, indicates in what districts it has been most prevalent. All Saints' shows 166, Westgate and Elswick 153, St. Andrews' 84, St. Nicholas' 44, and Byker 53. Separating Elswick from Westgate, we find that there were 51 in the former and 102 in the latter. The deaths have occurred principally in those districts where there is most overcrowding. Of 6 deaths in Westgate during the first fortnight of the epidemic, two occurred in one tenement in Diana Street, where there was too little air-space for the number of the family, and three in one house in Cottenham Street, where cellar kitchens were used as sleeping rooms. In the Diana Street cases, no clear history of infection could be made out. In those of Cottenham Street, the family ascribed the infection to the medical attendant of a lying-in woman, who was a lodger in the house. From her it spread to the children, and from them to another family, whose mother had visited the house. A glance at the chart will show how fatal it has been in the region between Westgate Hill and Barrack Road. In Buckingham Street, there have been 17 deaths, 7 in Pitt Street, 7 in Diana Street, and 6 in Cottenham Street; in the south-western portion of Westgate it has also been very fatal. There have been 9 deaths in Blandford Street, and 9 in George Street. In the portion between those districts, comprising Villa Place, Westgate Hill, Cumberland Row, Summerhill Terrace, Place, Grove, Westgate Hill Terrace, York Street, Lancaster Street,

Scarlatina has been most fatal where there has been greatest over-crowding.

Districts of greatest mortality from scarlatina.

Districts that escaped without a death.

and Summerhill Street, there was not a solitary death. The same rule has largely obtained in Elswick. There has been a considerable number of deaths in the thickly populated and overcrowded district in the neighbourhood of Scotswood Road, and also on the north side of Elswick Lane; while from that lane southward to Cambridge Street, not more than three or four deaths have been recorded.

The regions where scarlatina has been most fatal are those we find the most marked violation of sanitary law.

The regions in which scarlatina has most prevailed are those in which we discover the most palpable violations of sanitary law. Buckingham Street, flanked on the one side by part of Cottenham Street and Oaks Place, and on the other by Oyster-shell Lane, is greatly overcrowded. Most of the houses are almost back to back, and the open spaces so small that light and air can scarcely enter. Pitt, Diana, Cottenham, George, and Blandford Streets, are all more or less overcrowded, while the back streets are generally narrow, and the ashpits large and often damp. The regions that have escaped are those where, upon the whole, there are more open spaces, and where the people have room to breathe. The poison has been so intense that, in some instances, it has smitten down families enjoying every sanitary advantage, but the exception is so rare, that it only serves more fully to trace the rule.

Greatest mortality from scarlatina in All Saints where there is most overcrowding.

The greatest mortality from scarlatina has occurred in the parish of All Saints, where there is most overcrowding, and where all the circumstances favourable to the spread of any zymotic matter are found in greatest number and force. An atmosphere saturated with foul exhalations, is like a train of gunpowder, to which it is only necessary to apply a spark, and an infectious disease spreads through a whole district almost with the rapidity of a conflagration. The poison of scarlatina is much more infectious, and, therefore, spreads much more quickly than that of typhus. One case developed into malignancy by overcrowding, or by the peculiar change in the blood which goes on in the puerperal state,* may give to that poison such an intensity, that in a very few weeks it will infect a whole neighbourhood.

Necessity for isolation.

To that result, the carelessness of mothers and nurses greatly contributes. None who have the care of children, should needlessly expose themselves to its contagion; for, without being injured themselves, they may be the means of communicating it to those who are susceptible. The virus may be conveyed in the folds of a dress, or in the clothes of a child.† It is destroyed by heat at the boiling point, and, therefore, every article of wearing apparel, removed from a person ill of scarlatina, should at once be immersed in boiling water. Disinfection is as necessary in scarlatina, as in small-pox, or typhus. Mere fumigation, and the use of perfumes, are worse than useless; for they only hide miasmata, which

Disinfection.

*Appendix.

†Appendix.

it is necessary to destroy. In the sick room and in every part of the house, the utmost cleanliness should be observed; for in this as in other miasmatic diseases, dirt favours the spread of the poison, if it does not increase its intensity. The greatest attention ought to be paid to the free and thorough ventilation of the apartment. An abundant supply of fresh pure air increases the chances of the patient's recovery, and by diluting the poison, diminishes the peril of contagion. It is impossible to attach too great importance to the separation of the healthy from the sick. Like measles and whooping cough, scarlatina is so communicable, that no susceptible person can remain in the same room, and hardly in the same house, without contracting it. The common neglect of these precautions is fraught with danger. After the disease has subsided, the walls of the chamber where the sick person has lain should be whitewashed, or re-papered; the floor and wood well scoured, and the furniture and bedding disinfected, before any person susceptible of the poison be allowed to sleep in it.* The too frequent neglect of these simple precautions, and the difficulty of securing isolation, especially in the homes of the poor, tend greatly to spread the disease.

Cleanliness.

Ventilation.

The diffusion of the scarlatina poison very much dependent upon neglect of precautionary measures.

During an epidemic of scarlatina, it would be quite impracticable to remove all patients from houses where the means of nursing and of ventilation are imperfect, to hospital; but district hospitals, to which the first cases might be removed, would be of great service in checking the progress of the disease. There could be no more satisfactory evidence on this point than that of the Ragged School during the present epidemic. Twelve cases of scarlatina from that institution have been removed to the Forster Street hospital, where all the young patients have made good recoveries, and the disease has been prevented from spreading further. District hospitals should be placed under the care of the medical officers of the Union, but, under certain restrictions, it should be competent to any medical practitioner to send, to such hospitals, cases, where there are not the means of isolation and disinfection at home.

The first cases might be removed to district hospitals.

The great majority of the deaths from scarlatina are of children under five years of age. Every added year above that age greatly diminishes the danger of attack.* Parents, therefore, instead of yielding themselves up, with a blind fatalism, to the idea that their children must have those diseases, and the sooner the better, should neglect no precaution to shield them from scarlatina, and also from whooping cough and measles, the diseases to which they are most liable during this early and critical period. The first five years of existence safely passed, their chances of reaching mature life rapidly increase.

Scarlatina most fatal to children below five years of age.

A considerable portion of the mortality from scarlatina

* Appendix.

† Appendix.

Cold to be
guarded
against.

depends upon the after effects of the poison ; and the importance of guarding against cold, during convalescence, cannot be too deeply imprinted on the minds of those who are guardians of the young.

Dangers arising
from
sympathy.

Crowding
sick room.

In-door
gatherings at
funerals.

It is impossible successfully to grapple with this or any other epidemic without the hearty co-operation of the poor themselves ; and for this we have to rely more upon the spread of education and of knowledge than upon legal compulsion. Their sympathy with each other in the hour of sorrow, their fearlessness of danger, and their neighbourly helpfulness, are beyond all praise ; but they should temper kindness with caution, and, in their care for their sick friends, should not forget what is due to the community. Crowding in the sick room, and large in-door gatherings at funerals, are often the means of scattering the seeds of contagion far and wide. Much more safe, and not less respectful, is the Scottish plan of out-door assembling—the mourners waiting in the street, to accompany the relations in performing the last offices to the dead. In rooms, where there is scarcely breathing space for the living, the removal of those who die of dangerous contagious or infectious diseases, to mortuary chapels, should not be regarded otherwise than as a token of respect for the dead.

THE EPIDEMIC OF TYPHUS DURING 1863-4-5-6.

Typhus death-
rate in
Newcastle
during 1866,
double the
average of
England.

On reference to the table, at page 44, showing the principal causes of death in Newcastle, during 1866, arranged in the order of mortality, it will be seen that typhus, which in the Registrar General's classification, includes typhoid and relapsing fever, as well as typhus proper, stands sixth in order, accounting for 224, or 5.657 of the deaths from all causes. The mean annual mortality from typhus in England is 91 in 100,000 persons living ; but the typhus death-rate in Newcastle for 1866, was cent. per cent. greater, being 183 in 100,000.

The typhus
death-rate in
All Saints
during 1866,
nearly six
times greater
than that of
Westgate and
Elswick.

A comparison of the registration sub-districts, after distributing the deaths from typhus in the Fever Hospital to the districts whence the patients came, shows that the proportion of deaths from typhus, in 1866, to 100,000 persons living, was in All Saints, 403 ; Byker, 269 ; St. Nicholas and St. John, 144 ; St. Andrew, 79 ; Westgate and Elswick, 74. The proportion of deaths from typhus to 1000 deaths from all causes in All Saints, was 116 ; Byker, 91 ; St. Nicholas and St. John, 35 ; St. Andrew, 28 ; Westgate and Elswick, 25. The table on page 18, shows that the typhus death-rate has followed the distribution of small tenements in the borough, with all the precision and uniformity of a law.

The mortality from typhus during the past year has been the largest recorded since 1848. The Fever House returns

show that during the fifteen years which elapsed between 1848 and 1863, the admissions averaged in each year, about 82. In 1864, the number rose to 185; in 1865, it further advanced to 253; and for the year ending 30th April, 1866, it reached 562. Typhus is a disease of mature life; more than nine-tenths of the patients being upwards of twenty years of age. Of the patients received last year, 435 came from the Newcastle Union. Of these, 188 were from that portion of All Saints' east of Broad Chare, Manor Chare, and Carlol Square; 110 from the western portion of All Saints' and the whole of St. Nicholas'; 71 from the whole of St. Andrew's, Jesmond, Heaton, and Byker; and 66 from the whole of St. John's, Westgate, and Elswick. From 1st May, 1865, to 30th April, 1866, Pandon sent 47 cases to the Fever hospital, Mackford's Entry 19, Silver Street 25, Stockbridge 11, Wall Knoll 16, New Road 8, and Low Bridge 13. The localities from which most of the cases were sent, show to what an extent typhus is a disease of the poor, and how much it depends upon a vitiated atmosphere produced by overcrowding. This is further proved by the returns of the Medical Officers of the Union. In our large towns, where there is always more or less overcrowding, there are always some cases of typhus; but it has been epidemic in Newcastle since 1863. During that year 302 new cases were reported by the Medical Officers of the Union. For 1864, there is not a complete return, one of the medical books having been mislaid. In six of the districts, however, 196 new cases were reported; in 1865, 485; and last year 558.* These 1541 distinct cases of typhus, during the last four years, are exclusive of a considerable number that were at once sent to the Fever Hospital, and whose names do not appear in the medical relief books.

The mortality from typhus in Newcastle during 1866, the largest recorded since 1848.

The east end of the borough the great nursery of fever.

Evidence that typhus is, to a great extent, a disease of the poor.

A large proportion of the cases of typhus receive outdoor relief.

Return, shewing the number of new cases of Typhus Fever, reported by the Union Medical Officers, during the epidemic, 1863 to 1866.

No.	DISTRICT.	1863.	1864.	1865.	1866.	TOTAL.
1	St. Andrews...	68	29	34	20	151
2	Byker	58	...	37	45	140
3	All Saints ...	25	44	150	245	464
4	St. Nicholas ..	52	35	171	164	422
5	Elswick	56	11	14	5	86
6	Western	43	42	40	47	172
7	Westgate ...	...	35	39	32	106
	Totals ...	302	196	485	558	1541

1541 cases of fever returned by medical officers of Newcastle-on-Tyne Union, during the four years 1863—66.

Necessity for
re-arrangement
of districts.

Typhus first epi-
demic in St.
Andrews and
Westgate sub-
districts, and
then steadily
advances from
St. Nicholas
and All Saints,
where it has
most victims.

Probable influ-
ence of the
great commer-
cial activity of
the last months
of 1865 and the
first months of
1866 in pro-
ducing
overcrowding.

The medical relief districts, unfortunately, are conterminous neither with the registration sub-districts nor with the relieving officers' districts; and it is, therefore, impossible to apply the valuable information furnished in the above return to the elucidation of many questions of great interest in reference to the epidemic. Yet this is plain enough, that while since 1863, fever has considerably abated in some of the medical relief districts, it has greatly increased in others. The epidemic of typhus, following much the same course as that of scarlatina, but much more slowly, first seems to have made way in the west and north of the borough, and then to have spread gradually towards the east and south. In 1863, St. Andrews' medical district returned 68 new cases of typhus, or 22 per cent. of the entire number for the year; in 1864, 29 cases, or 16 per cent.; in 1865, 34 cases, or 6·8 per cent.; in 1866, 20 cases, or 3·6 per cent. With only a slight intermission in 1864, there has thus been a steady abatement of fever in St. Andrew's. Elswick has observed the same law, only with a still more marked decline, for the cases, returned by the medical officer of that district, (No. 5,) were 56, or 18 per cent. in 1863; 11, or 6·1 per cent. in 1864; 14, or 2·8 per cent. in 1865; and 5, or ·9 per cent. in 1866. In the Byker, Western, and Westgate medical relief districts, (Nos. 2, 6, and 7,) the cases of fever returned for the four years 1863—66, show no remarkable rise nor fall. It is far otherwise, however, with St. Nicholas and All Saints. In 1863, St. Nicholas' medical relief district, (No. 4,) returned 52 new cases, or 17 per cent. for the year; in 1864, 35 cases, or 19 per cent.; in 1865, 171 cases, or 34 per cent.; and in 1866, 164, or 29 per cent. The rise in the number of fever cases in All Saints' medical district, (No. 3,) was from even a lower point, and still more regular and marked. In 1863, the returns of the medical officer for that district show only 25 cases, or 8 per cent.; in 1864, 44, or 24 per cent.; while in 1865, they rose to 150, or 30 per cent.; and in 1866, to 245, or fully 44 per cent. of the whole. It has already been seen that these are the two districts where there is most overcrowding of houses, and of people in houses, and where, therefore, the typhus poison would find the most congenial soil. The greatest number of new cases of fever were returned in the last months of 1865, and the first months of 1866, a period of great commercial activity on our river, when Newcastle had, without any special preparation, to lodge the surplus population of the manufacturing villages on the Tyne. Although this is not a matter capable of statistical proof, it is well known that about that period it was impossible to find house accommodation in Jarrow, and that in the early morning the river-boats were crowded, almost to the water's edge, with work-people from Newcastle quay going to their labour. Nor does it require any proof that All

Saints, St. Nicholas, and Byker, from their contiguity to the river, were most likely to feel the pressure of these temporary lodgers. Among a population, exposed to such a combination of sanitary evils as we find in those sub-districts, it would be difficult to say whether prosperity or adversity will prove more destructive to life.

Since January, 1863, 620 deaths from typhus have been registered in this borough. In 1863, 91 deaths; 1864, 102 deaths; in 1865, 203 deaths; and in 1866, 224 deaths. Of these 620 deaths, 206 were registered in the Fever hospital. As the 206 deaths in the Fever hospital represent upwards of 1000 patients under treatment, and as the worst cases are sent there, the 620 deaths registered in the borough during the years 1863-4-5-6, must be regarded as representing not fewer than 3100 persons, mostly of mature years, who, during that period, have been afflicted with this terrible disease.* Eliminating from the fever-house death returns, during those years, all the cases that came from Gateshead and the surrounding district, we find that 169 deaths were of persons residing in Newcastle, 83 from All Saints, 27 from St. Nicholas and St. John, 20 from Westgate and Elswick, 17 from St. Andrew, and 22 from Byker. It will thus be found that in all 584 inhabitants of Newcastle have died during the epidemic, representing three thousand persons who have been ill of typhus. The returns of the London Fever Hospital, as given by Dr. Murchison, show nearly the same proportion of deaths to admissions, as our own. But Dr. Farr, of the Registrar General's Office, estimates a much larger number of cases to each death, and the following table is founded upon the basis which he has adopted.

From 3000 to 5000 inhabitants of Newcastle have suffered from typhus during the epidemic of 1863-66,

And 584 inhabitants of Newcastle have died of typhus during the epidemic of 1863-66.

Table, showing the annual number of cases (estimated), and of deaths by Fever in each of the sub-districts of Newcastle-upon-Tyne, in the four years 1863-66.

	Annual Deaths (Returned).				TOTALS.	Annual Cases (Estimated).				TOTALS.
	1863.	1864.	1865.	1866.		1863.	1864.	1865.	1866.	
All Saints	22	19	68	116	225	180	156	559	953	1848
St. Nicholas and St. John ...	9	18	26	18	71	74	148	213	148	583
Fever Hospital	4	6	20	6	36	32	49	164	49	294
Byker	12	7	40	36	95	98	57	329	295	779
St. Andrew... ..	10	15	18	14	57	82	123	148	115	468
Westgate & Elswick	34	37	31	34	136	279	304	254	279	1116
	91	102	203	224	620	745	837	1667	1832	5088

If Dr. Farr's estimate is to be relied upon, and it is founded upon a wide induction of facts, then, during the four years, 1863-66, every twenty-sixth person in the borough has suffered from typhus; the ratio of cases to the population, being in All Saints, 1 in 15; Byker, 1 in 17; St. Nicholas

1 in every 26 of the population has suffered from typhus.

The after effects of fever often a permanent injury to the constitution.

and St. John, 1 in 31; St. Andrew, 1 in 39; and Westgate and Elswick, 1 in 40. It is impossible to calculate the permanent influence upon the public health which is expressed in those figures; yet it is well known that the effects of fever upon the constitution are often very exhausting, and that in many cases they inflict an amount of injury, from which it never completely recovers. Apart, however, from these undetermined results, the sad fact remains that during the typhus epidemic of 1863—66, 584 lives have been sacrificed, most of which, under better sanitary conditions, would probably have been saved.

1 in every 209 of the population has died of typhus.

Of these 584 deaths, 71 belong to St. Nicholas and St. John; 57 to St. Andrew; 95 to Byker; 225 to All Saints; and 136 to Westgate and Elswick. Westgate registration sub-district, however, includes Benwell, Paradise, and Scotswood, and also the workhouse with an average of 600 inmates. Comparing the total number of deaths from typhus with the estimated population, we find that since 1863, 1 out of every 209 persons in the borough has died of typhus; above the average, All Saints 1 in 127, and Byker 1 in 140; below the average, St. Nicholas and St. John 1 in 249, St. Andrew 1 in 316, and Westgate 1 in 325. Excluding the workhouse, for every death from typhus in Westgate, there have been three in All Saints.

The fever dots on the annexed map point out the direction which sanitary work should take.

The annexed topographical chart of deaths from typhus, during the present epidemic, indicates the hot beds of that disease much more graphically than any mere words. A green dot is made for each death as close to the locality as could be made out; and the fever-house deaths are distributed over the borough, according to the places from which the patients came. The density of those green dots on the map is an all but unfailing index of the conditions, under human control, most inimical to life, and points out with almost absolute precision the direction which sanitary work should take.

The typhus poison largely depends for its diffusion upon vitiated air.

Of the 620 deaths from typhus recorded since 1863, a very small number belong to self-contained houses, a still smaller number to houses of above £20 annual rental; while more than nine-tenths of the whole belong to houses let in tenements. The typhus poison finds in great overcrowding, and in the vitiation of the air thence resulting, the one circumstance most favourable to its diffusion. Imperfect nourishment, intemperance, hardship, excessive fatigue, and want of cleanliness, everything indeed, in the habits and social condition of the people that tends to lower vitality, will render persons more liable to the disease; but the contamination of the air by organic and other impurities, is the condition under which the typhus poison assumes activity, and without which it seems robbed in a measure of its power. In a close badly ventilated room, with not more than 300 or 400 cubic feet of air space,

a typhus patient becomes a focus of contagion to all the inmates of the room, if not to all the occupants of the house, as well as attendants and visitors; while in a large, airy, well-ventilated apartment, or in a hospital, with not less than 1500 cubic feet of air space to each individual, such a patient is not only, other things being equal, more likely to recover, but is scarcely at all a source of danger to those who may wait upon him. Diminish the air space allowed to a typhus case, and you increase the intensity of the poison, and the danger of infection. Increase the air space and the ventilation, and you may so dilute the poison that it becomes almost innocuous. The poor, from the inner condition of their houses, the overcrowding of their rooms, and the non-ventilation of sleeping apartments, are brought into a condition like tinder, and it only wants a spark to light up typhus in a whole district.

Large air-space and thorough ventilation dilute the typhus poison and render it almost innocuous.

The inner condition of the homes of those who suffer most from typhus, is a frequent subject of comment in the yearly reports of the Physicians to the Fever Hospital. Dr. Embleton, in his report for 1864-5, says, "The rooms in which labourers in many cases live, are situated in confined and unwholesome yards and courts; and for space, light, air, and cleanliness, are models of insufficiency and insalubrity, and a disgrace to any civilized community; in them, men, women, and children lie at night crowded and huddled together; and as regards the men, the night shift succeeds the day shift, and the day shift the night shift, in unbroken series for some time together, the beds having scarcely time to cool, the whole house badly supplied with water, and worse with privies, dirty, unventilated, and pestiferous." Dr. Wm. Murray in his report for 1865-66, mentions a few cases which show how such conditions intensify typhus, and render it epidemic. "Out of one house there came six patients with three deaths; from Oyster Shell Lane, five; from one house in Tuthill Stairs, six cases; in Appleton's Buildings it attacked five. James Gibson, aged sixty, a letter carrier, formerly a very respectable accountant, is admitted from Brewery Yard, Byker Bank; with him he brings a daughter, sixteen years old, and on the following day another daughter, aged ten, is sent from the same place; one week before any of these came to the hospital, the aged mother died of fever, and the youngest son, aged fourteen, is just recovering from it; in two or three days the old letter carrier dies, and the two girls recover to find themselves orphans, deprived of both parents in twelve days. In the same house there is another family similarly attacked; and in another house in the same yard, no less than twenty cases of fever have occurred." Indeed there are spots so dark and foul, that almost every person susceptible of typhus has had the disease; and as it generally effects the system only once, its ravages cease for a time, until another generation springs up to be swept away.

The inner condition of the homes of those who suffer most from typhus, pestiferous in the extreme.

Testimony of Dr. Embleton.

Experience of Dr. Wm. Murray.

Warm and dry
weather
unfavourable
to the diffusion
of typhus.

A reference to the returns of the Fever House, the Union Medical Officers, and the Registrars, will show that there is always a lull in the epidemic during the summer months; and that typhus is most prevalent and fatal in the winter quarters. In the summer months it diminishes in proportion as they are warm and dry. The effects of climate are most evident in a non-epidemic year, but they are very marked even when there is great activity of contagion. The Fever House returns show in May, 1865, sixteen admissions, with five deaths; in June, fourteen, with one death; in July, thirteen, with two deaths; in August, twenty-seven, with five deaths; in September, thirty, with eight deaths; in October it rose suddenly to sixty-four, with twelve deaths; in November, it rose again to seventy-nine, with thirteen deaths; and in December, it reached ninety-six, with twenty-four deaths. In winter we have a low temperature which depresses vitality, and encourages the overcrowding and closeness of apartments.

Table, shewing the deaths from Typhus and Typhoid Fevers during the years 1863-66, arranged in months.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	TOTALS.
1863	9	5	7	3	3	7	2	12	10	10	8	15	91
1864	13	10	8	6	11	7	9	9	2	5	8	14	102
1865	11	11	6	17	14	3	3	6	12	35	45	40	203
1866	18	34	40	29	17	8	6	10	18	20	11	13	224
TOTALS.	51	60	61	55	45	25	20	37	42	70	72	82	620

June, July, and
August, the
months of
lowest mor-
tality from
typhus.

June, July, and August are the months during which there is the most marked diminution of deaths from typhus. A want of precision in the certificates transmitted to the Registrar, as to the causes of death, prevents an accurate analysis of the above table. Many are simply returned as deaths from "fever" or "continued fever," but whether typhus, typhoid (typhoid), or typhina (relapsing fever) does not appear; and until the medical registration of the causes of death is more accurate, such statistics are deprived of a great part of their value. Six of the nine deaths for July, 1864, are returned from Westgate as "fever." The elimination of all the doubtful cases from the table would show still more strikingly the influence of heat in arresting the progress of typhus. Severe cold has almost as great an effect. A moderate temperature and a moist atmosphere seem to favour its dissem-

ination. Typhus prevails, in fact, only in climates having a range of temperature between 40° to 60° Fahrenheit.†

From the vagueness of many of the certificates of death, as to its cause, it is impossible to ascertain the relative proportions in which fever in its various combined forms, typhus, typhoid, and relapsing, has prevailed during the past four years. Judging, however, from the returns of the physicians of the Fever Hospital, where accurate statistics have been kept, it appears that typhus has been the prevalent form of fever during those years.

Were it possible to separate all the cases of typhus from the rest, the disinfecting influence of the dry heat that would be still more marked.

Table showing the number of Fever cases treated in the Fever Hospital, during the years 1863-4, 1864-5, and 1865-6.

Years.	Typhus.	Typhoid.	Continu'd Fever.	Intermittent.	Totals.
1863-4..	105	2	10	2	119
1864-5..	181	3	5	1	190
1865-6..	513	2	22	...	537
Totals...	799	7	37	3	846

Typhus has been the prevailing form of continued fever since 1863.

The return of deaths by typhus during 1866, affords further illustration of the influence of heat, which the diagram of mortality presents to the eye.

Table showing the deaths from Typhus and Typhoid Fever, during 1866, in each of the sub-districts, arranged according to months.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Typhus.	Typhoid.	Total.
St. Nicholas & St. John, including Fever Hospital..	7	15	16	12	7	1	1	1	9	11	2*1	3	85	1	86
All Saints	6	12	15*2	6	5	4	3	3*1	4*1	4*1	5*1	4	71	6	77
St Andrew	...	1*1	3	1*1	...	...	...	2*1	...	...	*1	...	7	4	11
Westgate & Elswick	3*1	4	2	5	2	...	*2	1	2	1*2	...	1*2	21	7	28
Byker	1	1	1*1	4	3	3	...	1	1*1	*1	1	3	19	3	22
Borough ...	17*1	33*1	37*3	28*1	17	8	4*2	8*2	16*2	16*4	8*3	11*2	203	21	224

The influence of dry heat in arresting the progress of typhus seen in the returns of 1866.

The sign * is placed before each death from Typhoid fever.

The connection of typhus with meteorological phenomena will be best illustrated in the following tables, kindly prepared by Mr. Lyall, librarian of the Literary and Philosophical Society.

† Address on "Health" to Social Science Association, 1865, by Edwin Lankester, M.D., F.R.S.

Table, showing the pressure of the atmosphere, the mean temperature, the rainfall, and prevailing wind, with the number of deaths from typhus and typhoid fever, and estimated cases in Newcastle-upon-Tyne, in each of the weeks of 1864.

1864.	TYPHUS AND TYPHOID FE.		BAROME- TER.	THERMOMETER.			Total Rain in Inches.	Prevailing Wind.
	(Estimated) CASES.	(Recorded) DEATHS.		Stand	Wet Bulb.	Diff.		
Week ending								
Jan. 9	50	6	30.185	30°		..	.034	S E
" 16	41	5	30.134	34.5		..	.051	S
" 23	16	2	29.763	41°		..	.742	S S W
" 30	16	2	30.019	43°		..	.051	S
Feb. 6	24	3	29.941	38.5		..	.164	S W and N W
" 13	25	3	29.500	36°		..	.907	W and S
" 20	16	2	29.946	37.5		..	.155	N W
" 27	17	2	29.921	33.5		..	.615	W, N, and E
March 5	16	2	29.650	39.5	38.5	1°	.760	E
" 12	17	2	29.325	36.5	35°	1.5	2.230	N by E and W
" 19	3		29.865	41.5	38.5	3°	.255	W and E
" 26	16	2	29.785	40.5	37.5	3°	.381	E S E, W, and N
April 2	2		29.450	42.5	39.5	3°	.715	N W, S, and W
" 9	8	1	30.097	46°	44°	2°	.411	E and S
" 16	24	3	29.886	48.5	44.5	4°	.726	W, S, and E
" 23	16	2	30.007	54°	48°	6°	nil.	S
" 30	17	2	30.140	48°	45°	3°	.047	N E
May 7	24	2	29.767	51.5	48.5	3°	1.340	W and S
" 14	33	4	30.032	49.5	46.5	3°	.017	E
" 21	16	2	30.126	61°	56.5	4.5	.598	E, S E, N, and W
" 28	16	2	30.000	50°	46°	4°	.320	N E
June 4	16	2	29.801	51°	46°	5°	.073	W
" 11	8	1	29.800	60°	55°	5°	.225	W, N, and N E
" 18	16	2	29.685	58°	53.5	4.5	.483	S and W
" 25	8	1	29.900	58°	53°	5°	.750	S W and W
July 2	8	1	29.654	57°	52°	5°	.276	N, W, and S
" 9	16	2	30.063	56.5	51.5	5°	.053	W and N N E
" 16	8	1	30.130	56°	53°	3°	.612	N E
" 23	33	4	29.905	62°	56°	6°	.086	W and S W
" 30	2		29.810	62°	55°	7°	.121	W, S W, and S
Aug. 6	16	2	29.960	60°	55°	5°	.194	W
" 13	8	1	30.010	58°	52°	6°	.224	W, W N W, S, & E
" 20	24	3	30.045	57°	52°	5°	.117	N W and N E
" 27	24	3	30.086	53°	48.5	4.5	.064	N E
Sep. 3	16	2	29.764	60.5	55.5	5°	1.011	S W
" 10	8	1	29.732	59°	54°	5°	.381	W and S W
" 17	2		29.507	54°	50°	4°	.752	S W
" 24	8	1	29.743	56°	51.5	4.5	.183	W, S W, and W
Oct. 1	16	2	30.202	54.5	50.5	4°	nil.	S and W
" 8			30.300	52°	48°	4°	nil.	E and S E
" 15	8	1	30.137	50.5	46.5	4°	.021	N W and W
" 22	8	1	29.240	47°	44°	3°	3.845	W, S W, and E
" 29	16	2	29.566	49°	47.5	1.5	3.496	N and E
Nov. 5	2		30.291	46.5	43.5	3°	.081	S E, W, & N N E
" 12	8	1	30.028	40°	38°	2°	.043	N W and W
" 19			29.083	45°	43°	2°	.729	N W, S E, and S
" 26	24	3	29.220	41°	39°	2°	1.150	S and W
Dec. 3	8	1	29.901	46°	43°	3°	.348	S and S W
" 10	40	5	29.677	45°	43°	2°	.311	W, S W, and S
" 17	40	4	29.751	42°	40°	2°	.887	E
" 24	32	3	30.204	37°	35°	2°	1.835	S E, N E, and S
" 31	8	1	29.966	40°	37.5	2.5	nil.	W

Table, showing the pressure of the atmosphere, the mean temperature, the rainfall, and prevailing wind, with the number of deaths from typhus and typhoid fever, and estimated cases in Newcastle-upon-Tyne, in each of the weeks of 1865.

1865.	TYPHUS AND TYPHOID FE.		Above sea level. 21 ft. 3 in.				Height of gauges above the ground 18 inches.	Prevailing Wind.
DATE.	(Estimated) CASES.	(Recorded) DEATHS.	BAROME- TER.	THERMOMETER.			Total Rain in Inches.	
Week ending				Stand	Wet Bulb.	Diff.		
Jan. 7	32	4	29.700	40°	37.5	2.5	.564	W
" 14	32	4	29.044	42°	39°	3°	.094	W and S W
" 21	16	2	29.271	37°	35°	2°	.717	W, N E, and W
" 28	24	3	29.601	31.5	..	...	.160	W, S W, and E
Feb. 4	16	2	29.136	37°	..	...	.430	S E
" 11	17	2	30.150	84.5	..	...	.908	N E and S
" 18	28	3	29.642	32.5	..	...	.121	E, WSW, & WNW
" 25	16	2	29.991	40°	..	...	.360	W and S W
March 4			29.657	42°	39.5	2.5	.499	W and W by N
" 11	16	2	29.647	40°	36.5	3.5	.216	W and N W
" 18			29.957	38°	35.5	2.5	.106	E and S E
" 25	24	3	29.862	35.5	33.5	2°	.332	N W
April 1	16	2	30.004	42°	39°	3°	.533	NW, S, and S W
" 8	32	4	29.980	51°	46°	5°	nil.	S W
" 15	48	6	30.083	51°	46.5	4.5	.748	W and S E
" 22	8	1	30.240	43°	41°	2°	.827	N E
" 29	24	3	30.122	46°	42.5	3.5	.004	N E and W
May 6	32	4	29.700	53°	49°	4°	.985	S W and E
" 13	16	2	29.740	45.5	44°	1.5	1.601	N E
" 20	32	4	29.870	55.5	50°	5.5	.113	S W and W
" 27	8	1	29.940	62°	56°	6°	.233	S E, E, W, & S E
June 3	8	1	29.800	51.5	49°	2.5	1.177	W, E, S E, W by S
" 10	8	1	30.276	63°	57°	6°	nil.	W
" 17	8	1	30.420	36.5	51.5	5°	nil.	S E and N E
" 24			30.233	62°	56.5	5.5	.043	ESE, SW, and W
July 1	8	1	30.030	56.5	52°	4.5	nil.	ESE, E, and NE
" 8			29.800	65.5	58.5	7°	1.327	S W and ESE
" 15	8	1	29.727	60.5	56°	4.5	.815	NW, S W, and S
" 22	8	1	29.778	63°	58°	5°	.346	E and S
" 29	9	1	30.123	63°	58.5	4.5	..	E by S and W
Aug. 5			29.800	54.5	51°	3.5	.823	N and W
" 12	8	1	29.721	61°	57.5	3.5	.625	W, S, and SSE
" 19	8	1	29.610	60°	57°	3°	.843	S W and E
" 26	24	3	29.877	60°	57°	3°	.391	E and N E
Sep. 2	25	2	29.986	60.5	57°	3.5	.406	W
" 9	41	5	29.960	67°	61.5	5.5	..	W and S W
" 16	25	3	30.235	65.5	60.5	5°	.208	W, S, and S E
" 23	16	2	30.316	60°	56°	4°	.139	S and W
" 30	41	5	30.327	57.5	54°	3.5	..	S E and E
Oct. 7	49	6	30.113	55.5	53°	2.5	..	S E
" 14	98	12	29.650	52.5	51°	1.5	4.149	E and N E
" 21	107	13	29.323	46.5	44.5	2°	2.269	N E and W
" 28	107	13	29.347	44°	42°	2°	.936	S, W, and N W
Nov. 4	65	8	29.722	43.5	41.5	2°	.866	S W, N W, and W
" 11	57	7	30.160	44°	42°	2°	.296	NW, N E, and W
" 18	58	7	29.998	44.5	42.5	2°	.356	S E and S
" 25	99	12	29.045	47.5	45.5	2°	.969	S
Dec. 2	90	11	29.711	46°	44.5	1.5	.770	S E, N E, and S E
" 9	82	10	29.938	47°	45°	2°	.777	S E, S, and S W
" 16	66	8	30.555	40.5	38.5	2°	.026	W S W
" 23	49	6	30.100	46.5	44°	2.5	.004	S W
" 30	33	4	29.536	41°	39°	2°	.900	W, S, and S W

Table, showing the pressure of the atmosphere, the mean temperature, the rainfall, and prevailing wind, with the number of deaths from typhus and typhoid fever, and estimated cases in Newcastle upon-Tyne, in each of the weeks of 1866.

1866.	TYPHUS AND TYPHOID FE		Above Sea Level 21 ft. 3 in				Height of gauges above the ground 18 inches	Prevailing Wind.
DATE.	(Estimated) CASES.	(Recorded) DEATHS.	BAROME- TER.	THERMOMETER.			Total Rain in Inches.	
Week ending				Stand	Wet Bulb.	Diff.		
Jan. 6	50	6	29.653	42	40	2	.407	S W
" 13	57	7	29.695	35	33	2	.610	W and W N W
" 20	40	5	29.540	46.5	43.5	3	.107	W and S W
" 27	57	7	30.200	45.5	42.5	3	.158	W
Feb. 3	82	10	29.420	42	40	2	.449	S and S W
" 10	66	8	29.390	43	40.5	2.5	.322	W S W
" 17	82	10	29.462	36	34	2	.830	N W
" 24	57	7	29.794	40	37.5	2.5	.397	N W
March 3	66	8	29.522	34	4 obs. Froz.		.537	N E and W
" 10	24	3	29.700	36	Do.		.942	S E and N E
" 17	33	4	29.355	39	37	2	.239	W and S
" 24	82	10	29.540	40	38	2	1.152	N E and S
" 31	57	7	29.920	50	48	2	.259	W
April 7	74	9	29.975	41	39	2	.935	E
" 14	50	6	29.737	47.5	44.5	3	.633	N E and E
" 21	57	7	29.750	50	46	4	.156	W
" 28	58	7	30.080	47.5	44.5	3	.537	E
May 5	50	6	29.705	43	39	4	.678	N E and W
" 12	41	5	29.712	52	47.5	4	.734	W S W
" 19	33	4	30.200	51.5	46.5	5	.025	S E
" 26	16	2	30.034	52.5	46	6.5	nil.	E
June 2	16	2	29.836	52	47	5	.104	E and N E
" 9	8	1	29.980	60	56.5	3.5	.268	S E
" 16	25	3	29.668	56	51.5	4.5	.829	W
" 23	16	2	29.800	58	53	5	.198	S E
" 30	...	...	30.013	60.5	54.5	6	nil.	E S E and N E
July 7	8	1	29.430	56	51	5	.501	N W and N E
" 14	24	3	30.122	63.5	62.5	6	.457	W by S
" 21	17	2	30.075	58.5	54.5	4	nil.	N E
" 28	8	1	30.000	57	53.5	3.5	.085	E and N E
Aug. 4	24	3	29.601	57	53.5	3.5	2.682	N W and W S W
" 11	24	3	29.470	55.5	52.5	3	.822	S W and N W
" 18	24	3	29.726	57	53	4	.250	W
" 25	16	2	29.940	59	56.5	2.5	nil.	S E
Sep. 1	33	4	29.620	58.5	55	3.5	1.683	S W and N E
" 8	16	2	29.503	55	52	3	1.119	S and N W
" 15	16	2	29.442	55.5	52	3.5	.970	S E and S W
" 22	32	4	29.476	53	49	4	.310	S W
" 29	33	4	29.807	54.5	52	2.5	1.024	S
Oct. 6	50	6	30.242	54	52.5	1.5	.122	E N E
" 13	49	6	30.127	52	49.5	2.5	.029	S and E N E
" 20	33	4	30.040	51.5	49	2.5	.414	S E and S
" 27	32	4	29.765	50	48.5	1.5	.673	S and N W
Nov. 3	16	2	29.764	50	48	2	.683	S W and S E
" 10	16	2	29.700	47.5	44.5	3	.107	W and N W
" 17	41	5	29.650	42.5	40	2.5	1.320	W and N E
" 24	16	2	29.855	39	37	2	.196	N W and W
Dec. 1	33	4	29.964	40.5	38.5	2	.012	W and S E
" 8	33	4	29.510	43	41	2	.830	W and S W
" 15	8	1	29.565	41.5	39.5	2	.240	W and W S W
" 22	8	1	30.103	47	44.5	2.5	.054	W
" 29	25	3	29.313	45.5	43	2.5	.177	W

The foregoing tables would have been still more valuable, as illustrating the influence of meteorological phenomena, upon typhus, had it been possible to give the actual, instead of the estimated, number of new cases for each week. Yet it is abundantly manifest that there were periods during each recurring summer when, under the influence of favourable climatic changes, the number of new cases of typhus was relatively small; and when, had measures of isolation and disinfection been vigorously plied, there was a fair prospect of arresting the epidemic. But it has always been allowed to smoulder on, until fanned into a flame by a moderate temperature and a moist atmosphere. An accident that proves fatal to a few persons creates a great public sensation, and sometimes leads to an official enquiry; but hundreds of persons in the very prime of life are sacrificed to preventible causes, without any compunction of the public conscience, or at least without any efforts to save them, worthy of an enlightened and Christian people.

Last summer, the Public Health Committee paused in their labours when typhus was less prevalent; but if better advised they should only have redoubled their efforts at a time so favourable for isolating and stamping it out. The two great natural disinfectants of typhus are pure air and dry heat, and there is no period during which they can be so readily applied to the extinguishing of the poison as during the summer months.

This can, however, only be efficiently done by the cordial and vigorous co-operation of all the members of the medical profession. The facts already stated make it abundantly plain that to treat any case of typhus in a close, badly ventilated apartment, with not more than 400 cubic feet to each person, is to expose the whole neighbourhood to danger; and your sub-committee would respectfully but earnestly urge the medical men of the town to use their best exertions to induce persons, in such circumstances, to take advantage of the Fever Hospital.

Many of the facts relating to the contagiousness of typhus, which should be universally known, have found only too impressive illustration during the epidemic. Persons in comfortable circumstances, and living in localities where the disease is unknown, have been attacked on visiting infected persons at a distance. Typhus has been communicated by fomites, or by articles of clothing strongly impregnated with the specific poison, and dark-coloured woollen textures appearing to absorb and convey it more readily, than those which are light-coloured or of other materials. When it has made its appearance in a house let in tenements, it has spread much more easily from below upwards, than from above downwards; shewing the necessity of at once removing to a convalescent home all the upstairs occupants, when it has

There were weeks in each summer during which vigorous measures of isolation and disinfection would have arrested the epidemic.

Summer, the most favourable time for "stamping out" typhus.

Danger of treating cases in rooms of not more than 400 cubic feet.

Typhus is spread by infected air, articles of clothing and furniture.

In a tenement it spreads more readily from below upwards than from above downwards.

Wherever typhus is, windows should be kept open, and hot water plentifully used.

32 years was the average age of those who died of typhus during 1863-66.

shewn itself in such a house. Nor is there wanting evidence that the subtle poison adheres to floors, walls, and articles of furniture. Hence the necessity for disinfection, for complete ventilation, and for the plentiful use of hot water.

It has been seen that a large proportion of the typhus patients received into the Fever Hospital were of mature years; and this is in conformity with the well-known fact that typhus is the zymotic disease most fatal to men and women in the prime of life. The average age of those who died during the typhus epidemic of 1863-66 was 32 years.

Table, showing the number of deaths from Typhus Fever (for the years 1863, 1864, 1865, and 1866) of Male Persons above 20 years of age.

SUB-DISTRICT OF THE NEWCASTLE UNION.					Total 4 years.	Per centage of entire deaths from Typhus.
	1863.	1864.	1865.	1866.		
St. Nicholas and St. John	9	16	45	34	104	16.6
All Saints	6	5	7	28	46	7.3
St. Andrew	2	1	4	4	11	1.7
Westgate and Elswick	7	10	9	12	38	6.0
Byker	3	4	9	9	25	4.0
Total	27	36	74	87	224	35.8

During the 4 years 224 adult males above 20 years of age died of typhus.

The number of deaths of male persons above 20 years of age, during the epidemic, forms 35.8 per cent. of the whole; while that of adult females is still larger.

The habitats of fever are sufficiently indicated in the map and tables which will be found in the appendix; but the principal fever-breeding localities are seen at a glance in the following table, showing the districts from which patients were removed to the Fever Hospital, from 1st January to 31st October, 1866.

Number of Cases of Fever or Infectious Disease.		Number of Cases of Fever or Infectious Disease.	
Pandon Dene District	63	Scotswood Road ...	8
Ouseburn ...	26	Byker ...	7
Castle Garth ...	24	Manors ...	6
Sandgate ...	23	Stepney ...	5
Newgate Street ...	22	Gallowgate ...	5
Westgate Street ...	16	Borough Gaol ...	4
Barrack Road ...	15	Side ...	4
New Road ...	13	Forth Street ...	1
Stockbridge ...	12		
St. Peter's ...	11		
Close ...	10		
Pilgrim Street ...	8		
			283

Pandon, the ancient seat of Northumbrian kings, the great fever centre of Newcastle.

In Pandon, where the epidemic of typhus has raged with frightful virulence, and where it has been pre-eminently fatal to the heads of families, the conditions favourable to the existence and the spread of zymotic disease are found in great

abundance and intensity. A good many of the houses are built back to back, and thorough ventilation, if not an absolute impossibility, is at least very difficult of attainment. Many are without privy accommodation of any kind, and where it does exist it is generally scanty and defective. From the absence of any back street, the middens can only be emptied through the main entrance to the dwellings; most of the yards are badly paved, and very imperfectly drained. The water supply is generally deficient, and there is one whole row of tenements without any supply at all. The typh poison, finding a congenial soil in constitutions broken down by intemperance, riot, destitution, and the mephitic air of overcrowded rooms, these are the external circumstances which render it so contagious and deadly. To raze Pandon to the foundations, and reconstruct it with due regard to health and decency, would be true economy. The same may be said of those other centres of contagion—Silver Street, the Wall Knoll, Blyth's Nook, Dog Bank, Church Walk, the Ouseburn, and Sandgate, with its labyrinth of lanes and chares. So long as such places are permitted to exist, under whatever inspection, and with whatever care, our death-rate must always be high, and Newcastle must ever remain a hot-bed of epidemics.

Appalling accumulation of sanitary evils in Pandon.

It can only be cured by being pulled down.

Silver Street, the Wall Knoll, Dog Bank, Church Walk, and Sandgate, should be swept away.

Typhus depends upon known and remediable causes. A few years ago, under the name of jail fever, it raged in our prisons, and from them found its way to our courts of justice, levying black mail upon judges, jury, barristers, and others. But now, we never hear of a Black Assize. With cleanliness and sufficient ventilation in our prisons, typhus only makes its appearance there when it is imported. Up to the year 1857, when the Common Lodging-house Act was passed, our common lodging-houses were dens of fever, because they were overcrowded, badly ventilated, and dirty. Since the provisions of that Act have been put in force, a marked change has taken place, and fever rarely occurs. The carrying out of similar regulations in tenements would, doubtless, be equally effectual; and such regulations are neither irksome nor costly. Windows in every room, so made, that they can be opened; sufficient air space; floors, stairs, and bedding kept clean; walls and ceilings limewashed; open fireplaces; holes opened for ventilation where there are none; the instant removal of any cases of infectious disease; thorough ventilation and personal cleanliness; these simple and homely measures, if rigorously adopted, would speedily banish typhus from the homes of the poor.

Typhus can be banished from the homes of the poor by thorough ventilation and cleanliness.

DIARRHŒA.

Diarrhœa may be regarded generally as the immediate result of unwholesome diet, excess in food and drink, cold, wet, fatigue and exposure, sudden impressions upon the sympathetic nervous system, and various functional derangements of the biliary and gastro-intestinal apparatus.

Causes of diarrhœa

Heat favours the development of diarrhoea.

"Each season has its own disease." Heat, which acts as a disinfectant upon the typhus poison, favours the development of diarrhoea. And thus, as a rule, in summer, when the typhus death-rate falls, that of diarrhoea rises.

In summer when the death-rate falls that of diarrhoea rises

Table, showing the number of deaths from Diarrhoea in each of the months of 1866, according to registration sub-districts, Newcastle-upon-Tyne.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Totals.	Deaths to 100,000 persons living.
Westgate & Elswick...	3	6	9	2	3	4	8	11	14		2	6	68	149
All Saints ...	2	1	2		2	1	3	4	9			2	26	90
St. Andrew ...		1					6	3	2		1		13	73
Byker ...				1		2		1	3		2		9	67
St. Nicholas & St. John	1		1				1	1	2		1		7	41
Whole Borough ..	6	8	12	3	5	7	18	20	30		6	8	123	100

123 deaths by diarrhoea, which in 1866 was 59 per cent. more fatal in Westgate and Elswick than in All Saints.

The month of October, with no returns for diarrhoea, seems an exception to the rule, but its place was only too well filled by 12 deaths from cholera, and 16 from choleraic diarrhoea, or summer cholera. It has been proved that each district, as well as each season, has its own disease. Diarrhoea in 1866, was 59 per cent. more fatal in Westgate and Elswick than in All Saints, 76 per cent. than in St. Andrew, 82 per cent. than in Byker, and 105 per cent. than in St. Nicholas and St. John.

The great number of unpaved streets and the large wet ash pits in Westgate and Elswick are a source of diarrhoea and invitation to cholera.

Elswick, with its long lines of unpaved, unsewered streets, on which gradual accumulations of decaying animal and vegetable matter are exposed to alternate sunshine and rain, presents circumstances eminently favourable for the development of diarrhoea, as heat and poisonous emanations from decomposing substances are the chief causes of this disease. Epidemic diarrhoea is a disease of the autumn months, and is considerably dependent on a slight rain fall. Heavy showers purify the air and cleanse the streets; while light rains, in hot weather, by encouraging fermentation, rather increase the evil. Unpaved streets in front, and large wet ashpits in narrow lanes behind, are a standing invitation to diarrhoea, and a permanent danger to the public health.

CHOLERA.

31 deaths by choleraic diarrhoea and 20 by cholera.

In the Registrar-General's classification, choleraic diarrhoea has no place, but in the returns of mortality for Newcastle, during 1866, it is made to account for 31 deaths, while cholera accounts for 20. The phenomena of the first stage of cholera are so marked and peculiar, that it cannot well be mistaken for any other disease;* and any attempt to conceal

* A pendix XVI.

the facts, where the dissemination of disease so much depends on contact, by leading to the neglect of precautionary measures, is likely to be fraught with danger to the public health. The Privy Council Orders require that instant information shall be furnished to the Board of Guardians of any case of cholera, and, under no circumstances, is prompt action more needed, nor likely to be productive of better results.

Any attempt to conceal an outbreak of cholera is fraught with danger.

At the end of June, the temperature in London was excessively high, and after that, cholera cases were noticed; in July, it became epidemic. In Liverpool, during the same period, the heat was excessive, "accompanied by great stillness of the air and remarkable sultriness." These are the meteorological conditions that seem to favour an outbreak of cholera. But during the summer of 1866, the thermometer never rose so high in Newcastle as in either of those cities.

Great heat, sultriness, and stillness of the atmosphere favour the spread of cholera.

Organic impurity of water seems greatly to favour the development and spread of the cholera poison; but in this respect, the water supply of last summer will favourably compare with that of previous years, when cholera swept away so many of our population.

So does organic impurity of water.

Except as regards water supply, the sanitary condition of the town, and the house accommodation for unskilled labourers, is but little improved since 1853, when in nine weeks cholera swept away 1500 or 1 in 60 of the inhabitants of the town. In 1856 there were in All Saints 4300 occupiers of one room and only 850 of two rooms; so that, from the table on page 18, it appears that there is a decrease of 900 of the former, and an increase of 1000 of the latter. The lodging is thus somewhat better, but the overcrowding is probably greater than it was then. Had the atmospheric influences been favourable, and had the cholera poison been awakened into activity, it is impossible to conceive the results, in circumstances so likely to disseminate any zymotic matter. The points of greatest danger are unequivocally indicated in the cases that did occur. 9 cases of cholera, and 14 of choleraic diarrhoea, or 78 in 100,000 living, were registered in All Saints; 7 of cholera and 11 of choleraic diarrhoea, in Westgate and Elswick, or 37 in 100,000 persons living.

The water supply was better, and the number of single rooms fewer, but the overcrowding of tenements probably greater, than in 1853.

The overcrowding, the imperfect ventilation, the want of drainage in All Saints; the 155 unpaved streets in Westgate and Elswick, with narrow back lanes, and large wet middens; and the evils disclosed by the recent sanitary inspection in all the sub-districts, are matters which demand immediate attention, if we would avert the epidemics for which Newcastle has gained such an unenviable notoriety. The germs of the cholera poison are, doubtless, widely diffused; yet this need occasion but little anxiety, if our water supply is abundant and pure, and if, as individuals, and as a community, we pay due regard to the laws of health. To say that there is no danger, because we have once escaped, is to ignore all the teachings of history

Overcrowding, bad ventilation, want of drainage, unpaved streets, large wet ash pits demand immediate attention if we would be prepared for cholera.

and experience; and to defer putting our streets and houses in order, until the evil is upon us, is as costly as it is criminal.

Table, showing the number of deaths from Cholera and Choleraic Diarrhoea, in each of the registration sub-districts of Newcastle-upon-Tyne, in 1866.

The deaths from choleraic diarrhoea or summer cholera are distinguished by † being placed before them.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	TOTAL.	Deaths to 100,000 persons living.
Westgate & Elswick ... }							†1			2†6	5†3	†1	7†11	37
All Saints							1	†1	†4	8†6	†3		9†14	78
St. Andrew ...									†2	†2			†4	22
Byker									1	2†1			3†1	29
St. Nicholas & St. John }										1	†1		1†1	11
							2	1	7	28	12	1	51	40

Effects of overcrowding seen in the spread of contagious diseases.

The overcrowding and the arrears of sanitary work disclosed by the recent inspection are circumstances eminently favourable to the spread of other diseases. In a population densely crowded together, exposed to air poisoned by the noxious effluvia of middens, or rendered stagnant by the enclosed position of streets and courts, a contagious disease must go through them as it goes through a flock of sheep. Here, as elsewhere, the laws of mutual dependence and inter-relationship hold sway; and the wealthy and well-to-do classes must expect to suffer more or less with their poorer neighbours.

And in the greater fatality of constitutional diseases.

CONSTITUTIONAL DISEASES.

The effects of these unsanitary conditions are not confined to zymotic diseases, but are almost as distinctly marked in the mortality tables of the constitutional diseases. The deaths of this class in Newcastle, during 1866, were 19 per cent. in excess of the mean annual mortality of England.

TUBERCULOUS DISEASES.

Tubercles last year destroyed 506 to 100,000 persons living, or 1 in 6 of those who died.

It was in the tuberculous order of constitutional diseases that the mortality of Newcastle, in 1866, most exceeded the average, the proportion being as 506 to 349 in 100,000 persons living. In the temperate zone, where the civilized inhabitants of the globe are located, it is calculated that 1 in 10 of the population die of tuberculous diseases; the proportion in this borough, last year, was 1 in 6. There are many circumstances which may be regarded as predisposing to the formation of tubercle, such as the influence of parental health and habits, of race, and of depressing passions; but the weight of evidence seems to point to the impoverished nutrition

resulting from impure and damp air, and an improper quantity, quality, or assimilation of food as the chief causes of this terrible disease. Dr. Alison demonstrated that the mortality from scrofulous diseases, among the children of the poor, in Edinburgh and other large towns, was so great, that they died in the enormous proportion of 45 or 50 to 5, and even 3, as compared with the agricultural and richer classes; and the valuable reports of Mr. Simon have tended to establish the same general conclusions.

Impure and damp air are predisposing causes of the formation of tubercle.

TABES MESENTERICA.

The disease, which is expressed by the deposit of tubercle in the glands of the mesentery, known as tabes mesenterica, or popularly as consumption of the bowels, was singularly fatal in Newcastle during the past year. Among the causes of death in England, in the year 1864, arranged in the order of mortality, it stood 22nd, accounting for 12 in 1000 of the entire deaths; while among the causes of death in Newcastle, in 1866, it stood 8th in the order of mortality, accounting for 43 in 1000 of the entire deaths. In Byker, where there are, or recently were, 1690 single-room tenements, occupied by 51,070 persons, or 37 per cent. of the entire population, consumption of the bowels has been very fatal, accounting for 66 in 1000 deaths. In All Saints, with a population of 10,200 persons, or 34 per cent. of the whole living in 3400 single-room tenements, it accounts for 57 in 1000 deaths. In St. Andrew, with 36 per cent. of its population living in single-room tenements, it accounts for 47 in 1000 deaths from all causes. In Westgate and Elswick, with only 1411, or 8 per cent. of its population living in single-room tenements, but with almost all the streets in which these tenements are situate, unpaved, it accounts for 31 per cent. While in St. Nicholas and St. John, with most of its streets paved and sewered, but with 3735, or 18 per cent. of its population living in single-room tenements, it accounts for 32 per cent. of the deaths from all causes. The mean annual mortality for England of tabes mesenterica is 26, and for Newcastle 140, in 100,000 persons living; while in each of the sub-districts, the following were the proportionate numbers:—All Saints, 198; Byker, 195; St. Nicholas, 131; St. Andrew, 129; and Westgate and Elswick, 96; the lowest being nearly four times greater than the average of England.

For every death caused by consumption of the bowels in England there were, for the same proportion of persons living, at least five in Newcastle during 1866.

Its distribution in the sub-districts follows that of small tenements and overcrowding.

PHTHISIS.

During 1866, 400 deaths in Newcastle were registered from pulmonary consumption, or at the rate of 337 to 100,000 persons living, being 75 in excess of the mean annual mortality of England for that disease. Among the principal causes of death, it stood 2nd, accounting for 10·12 per cent. of the deaths from all causes. Comparing Newcastle with

400 deaths by phthisis in Newcastle, or 75 in excess the average England.

Phthisis more fatal in Newcastle than in Leeds.

other large towns, the deaths from phthisis are excessive. In Leeds, for example, the deaths from phthisis, in 1860, 61, and 62, were at the rate of 282, and for the whole of the West Riding, at the rate of 278 to 100,000 persons living.

Table, showing the number of deaths from Phthisis in each of the registration sub-districts, of Newcastle-upon-Tyne, arranged in order of months, 1866.

Many phthisical patients sent to the Infirmary, which explains the high death-rate from consumption in St. Nicholas.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	TOTALS.	Deaths to 100,000 persons living.
St. Nicholas & St. John }	6	6	9	11	8	5	6	7	9	8	5	5	85	508
Westgate & Elswick.. }	8	10	13	15	17	10	12	12	16	5	10	21	149	327
St. Andrew ...	2	6	5	7	6	4	3	4	3	1	7	7	55	310
Byker	4	3	4	4	5	2	3	7	1	1	1	2	37	278
All Saints.....	2	5	10	8	6	5	4	8	10	4	6	6	74	257
Borough	22	30	41	45	42	26	28	38	39	19	29	41	400	327

Leaving out of consideration the mortality from phthisis in the sub-district of St. Nicholas and St. John, which includes the deaths in the Infirmary, a comparison of the other sub-districts shows a death-rate from phthisis in Westgate and Elswick of 327; St. Andrew, 310; Byker, 278; and All Saints, 257 in 100,000 persons living.

Want of pure air, want of sun-light, and damp are circumstances favourable to the development of tubercular diseases, which have been most fatal in Westgate and Elswick, where there is most damp.

The principal conditions, in some measure under municipal control, favourable to the development of tubercle in the lungs, are want of pure air, want of sun-light, and damp; and while each of these causes, in varying degrees, operates in every registration sub-district, it is impossible to resist the conviction that the high mortality from consumption, in a sub-district like Westgate and Elswick, upon the whole the healthiest in the borough, is largely dependent upon its 155 unpaved and unsewered streets, its wet ashpits, and its damp cellar dwellings. The vapours of marshy lands are known to favour the deposit of tubercle; while it is often arrested by living on a dry soil, and in a uniform and temperate climate. The mere removal of subsoil water by complete drainage, to some extent accomplishing both objects, is likely, in a great degree, to diminish the mortality from consumption; and it is stated that Dr. Buchanan, one of the Medical Officers of the Privy Council, has ascertained that such simple sanitary means have, in certain towns, reduced the mortality from that insidious and terrible disease 41 per cent.

There can be no reasonable doubt, that the great overcrowding of our tenements has formed one of the predisposing causes of this excessive mortality from phthisis. Vitiating of air increases the mortality of lung diseases. To quote the words of Mr. Simon, the Medical Officer of the Privy Council, "when many persons are employed together at in-door industry, the ventilation of the work place is likely to be so bad as to convert the employment, which perhaps in its own nature is not of a hurtful tendency, into an employment dangerous to health. The bad ventilation which as a rule belongs to the place of employment, tends to develop among the work-people a large excess of phthisis (consumption), and probably also some excess of other fatal lung diseases." What is true of work-rooms and factories, is not less true of the homes of the people; and the exhausted and vitiated air of the defective, undrained, badly ventilated tenements, occupied by our unskilled labourers, is a fruitful source of scrofula and consumption.

The great overcrowding of the small tenements has contributed to the excessive mortality of phthisis.

Baudelocque says: "Personal experience, reading, reflection on a great number of facts, and the analysis of many observations, have impressed me with a deep conviction that there exists one principal cause of scrofulous disease, a cause which predominates over all others, and without which, perhaps, the disease would never, or at least very rarely, develop itself. The cause consists in particular conditions of the atmosphere in which the individual resides. However ill chosen or unsubstantial his food may be, however much cleanliness may be neglected, whatever be the nature of his clothing and its adaptation to the temperature, whatever the climate in which he lives, the exercise he takes, or the duration of his sleeping or waking, if the house in which he dwells be placed in a situation to which the fresh air and the sun's rays have free and direct access, and the house itself be sufficiently airy, light, and well-proportioned to the number of its inmates, scrofulous disease will never make its appearance."

Baudelocque says that want of fresh air and sunlight are the great predisposing causes of scrofula.

Although this may be regarded as an extreme view, it will be true wisdom in the Corporation to act upon it, in preserving open spaces, in widening streets, in opening-up thoroughfares into densely crowded localities, and in remodelling their by-laws in regulating the erection of new houses, and the laying-out of new building ground.

The wisdom of acting upon the theory even if it is regarded as extreme.

Where, from narrowness of streets and lanes, there is want of air, there is also generally want of sun-light; and the position of our streets, and their width, have been fixed without any recognition of the important part which light plays in the animal economy. No high form of vegetation thrives in the absence of light; and for the higher forms of animal life, it seems even more necessary. Many of the wretched tenements of our narrow alleys and chares never enjoy a direct ray of light. They are ever in the shade, and of their

Sunlight needed for the life of the higher forms of vegetable and animal life.

Deficiency of light is a predisposing cause of scrofula, rickets, and other diseases

inmates it becomes the shadow of death. Dr. James Braithwaite remarks that "scrofula, rickets, and many other diseases of children are specially predisposed to by deficiency of light, which is almost as essential as pure air is. Children reared in cellar-kitchens, or in dark small-windowed houses, with a north aspect, are always delicate, and frequently scrofulous." There are hundreds of families in Newcastle, living in chares and alleys not two yards wide, that suffer from all the ill-effects of deprivation of sun-light. A well known instance of the effect is that mentioned by Sir James Wylie, who states that in a large barrack at St. Petersburg, the cases of disease on the dark side of the building were three times more numerous than on the side exposed to strong light.*

And sub-soil drainage, wider streets, open spaces, and better dwellings would reduce the mortality caused by tuberculous diseases.

With thorough sub-soil drainage, wider streets properly paved and sewered, more open spaces, play grounds for children, and better constructed and ventilated dwellings for the industrial classes, we may reasonably expect a considerable diminution in the mortality from diseases of the tuberculous order.

LOCAL DISEASES.

Unfavourable sanitary conditions intensify local diseases, and render them more fatal.

Nearly every disease affects the whole organism, either directly or indirectly; and unhealthy conditions affecting the whole system, leave their impress in an increased mortality from local causes. If all the members of the human body suffer from bad hygiene or vitiated air, diseased action set up in one member, is likely to be intensified and rendered more fatal. Every circumstance tending to lower vitality is favourable to the production of local inflammation, and sanitary improvements diminish the liability to death from diseases of special organs. Dr. W. T. Gairdner observes, that in proportion as we are getting rid of the severer forms of epidemic disease (e. g., fever, dysentery, scurvy, influenza, all more or less preventible,) which had deteriorated the health of the population previous to 1848, we are also getting rid of the more severe and unmanageable types of acute inflammation. Inflammatory diseases, like fevers, he therefore justly considers to be subject to epidemic causes of increase and diminution, both as regards frequency and severity; and he believes that the acute inflammations are nearly as much under the influence of the sanitary reformer as the more obviously epidemic fevers; and further, that some even of the chronic organic diseases have already yielded, and may be expected still further to yield, to the improved habits, the better clothing, the greater abundance of food, and the diminished destitution of the population generally.†

Inflammatory diseases may be diminished by sanitary reforms.

The vital statistics of Newcastle, during 1866, furnish abundant negative illustration of these important truths.

* Hole's Homes of the Working Classes, p. 14.

† Dr. W. T. Gairdner's Clinical Medicine, p. 42.

Where the circumstances have been most calculated to spread any zymotic matter, local diseases have also been most fatal. In Newcastle, for 1866, 1342 deaths were attributed to local diseases, being at the rate of 1109 to 100,000 persons living, or 295 above the average of England. The haunts of fever are also the hot-beds of local disease. Although many cases of that character are sent to the Infirmary, and when terminating in death, go to swell the death-rate of St. Nicholas; the mortality in All Saints, from local diseases, is above the average for the borough.

The haunts of fever are also the hotbeds of local disease.

DISEASES OF THE NERVOUS SYSTEM.

Where so many influences are at work tending to poison the nervous centres, we need not wonder to find an excessive mortality from nervous diseases. To this order 438 deaths were ascribed, being in the proportion of 315, or 37 to 100,000 persons living, above the average of England. The multiplicity and intensity of sanitary evils, in All Saints, again made themselves felt; the mortality from nervous diseases, in that sub-district, being 81 deaths to 100,000 persons living, above the average of the borough.

Nervous diseases have been most fatal in All Saints, where typhus has raged with greatest intensity.

DISEASES OF THE ORGANS OF CIRCULATION.

The diseases of this order seem to obey a different law; for although more fatal in Newcastle during 1866, than over the whole of England, in the ratio of 119 to 82, of 100,000 persons living, they caused a greater relative mortality in St. Andrew than in any of the other sub-districts. Still, in deaths from diseases of the organs of circulation, All Saints, last year, was 47 per cent., while St. Andrew was no less than 60 per cent. above the mean annual mortality of England under that head. Among the principal causes of death in Newcastle, during 1866, heart disease accounts, in St. Andrew, for 4.93 per cent.; All Saints, 3.7; St. Nicholas and St. John, 3.38; Byker, 3.3; and Westgate and Elswick, 3.17 per cent. of the deaths from all causes.

Heart disease was only less fatal in All Saints than in St. Andrew, where it caused 4.93 per cent. of the deaths from all causes.

DISEASES OF THE RESPIRATORY SYSTEM.

The deaths of this order in Newcastle, during 1866, amounted to 484, or 12.3 per cent. of the deaths from all causes. As might have been anticipated, from the impurity of the atmosphere, and the overcrowding existing in tenements, they are above the average of England in the proportion of 436 to 311 in 100,000 persons living. Of all monorganic diseases those affecting the breathing organs are the most fatal. The deaths of this order, with those by phthisis from Class II., amount to 784, or to nearly one-fourth, (.223) of the deaths from all causes.

484 deaths or 12.3 per cent., caused by respiratory diseases, and including phthisis 22.3 per cent.

BRONCHITIS.

Bronchitis, greatly influenced by temperature, was most fatal in All Saints.

Excluding phthisis, bronchitis has been the most fatal of the respiratory diseases, accounting for 287 deaths, or 7·26 per cent. of the total mortality of 1866. It is invariably influenced by a depression of temperature, 100 deaths having been registered in the first quarter, and 67 in the last. The proportion of deaths caused by bronchitis to 100,000 persons living, was in All Saints, 285; St. Nicholas, 257; St. Andrew, 224; and Byker, 124; while that for the whole borough was 235; the average for England being 134. Of the deaths from all causes, bronchitis accounts in St. Andrew for 8·8, All Saints 8·2, Westgate and Elswick 7·3, St. Nicholas and St. John 6·3, and Byker 4·3. This immense disproportion in the relative returns for bronchitis, in the five registration sub-districts, will be best understood after considering those for pneumonia.

PNEUMONIA.

Pneumonia was most fatal in Byker.

Inflammation of the lungs was fatal in Newcastle, last year, to 135 persons. Its fatality is considerably influenced by temperature, although not quite so much as bronchitis. In the winter months it destroyed 70 lives, 37 in the first, and 33 in the last; while in the second quarter, it was fatal to 30, and in the third to 35 persons. It accounts for 3·41 per cent. of the deaths from all causes; in Byker 5·3, Westgate and Elswick 3·9, St. Andrew 3·2, All Saints 2·5, and St. Nicholas and St. John 1·7 per cent. The order of bronchitis is as nearly as possible reversed in the case of pneumonia. But the two diseases are often confounded, and are often combined, when they prove fatal, in varying degrees. Regarding them, then, in their combined form, as broncho-pneumonia, we find their inequality of distribution greatly corrected. Bronchitis and pneumonia were fatal in 422 cases. The proportion to 100,000 persons living was 345, or 87 in excess of the average of England, which is 258. The greatest excess was found in All Saints, where the deaths by bronchitis and pneumonia were at the rate of 372; and in St. Nicholas they were at the rate of 370; Westgate and Elswick, 342; St. Andrew, 332; and Byker, 284 in 100,000 persons living.

Bronchitis and pneumonia are often confounded; and also often found in combination.

When regarded as broncho-pneumonia, most fatal in All Saints.

DISEASES OF THE DIGESTIVE ORGANS.

218 deaths from diseases of the digestive system, or 84 above the average of England,

218 deaths in Newcastle, during 1866, were ascribed to diseases of the digestive system, being in the ratio of 175 to 100,000 persons living, or 74 above the average of England, which is 101; another evidence of the fact that the conditions favourable to the spread of epidemics, tend to debilitate the whole body and to set up organic diseases. Among diseases of the digestive system, gastritis accounts for 2 deaths,

enturitis 10, peritonitis 12, ascites 4, hernia 1, ileus 1, intussusception 1, stomach disease 20, jaundice 8, liver disease, 46, and ulceration of the intestines 104. The most remarkable fact is the great mortality attributed to the last-named disease. Among the causes of death, in England, in the year 1864, arranged in the order of mortality, ulceration of the intestines takes the 59th place, accounting for 907, or 1·847 in 1000 deaths from all causes, while the Newcastle bills of mortality show more than one-ninth of the number for all England, or in the proportion of 26·312 to 1000 deaths from all causes, ulceration of the intestines taking the 14th place. Among the causes of death arranged in the order of their mortality, in St. Andrew's sub-district, ulceration of the intestines rises to the 7th place, accounting for 5·142 per cent. of the deaths from all causes. At that ratio, the deaths by ulceration of the intestines, in England, instead of ranging from 800 to 900, over a long series of years, would have been about 30,000 per annum! Even this high death-rate from ulceration of the intestines, was exceeded in St. Nicholas and St. John; for while the average annual mortality, caused by that disease in England, is 4·3, in that sub-district it was 161, to 100,000 persons living, or at the rate of nearly 35,000 for the whole of England instead of 900! The proportions to 100,000 persons living in the other sub-districts, are as follows:—St. Andrew 141, Byker 67, Westgate and Elswick 63, and All Saints 48. Even in the sub-district where it was least fatal, it was still ten times more fatal than in England as a whole. Ulceration of the intestines is by no means an infrequent result of typhoid fever, and it is possible that in the certificates of death the effect may have been put for the cause. If not, it would be important to ascertain something more about the diagnosis and etiology of a disease that occupies so startling a place among the causes of death in Newcastle in 1866.

Remarkable mortality caused by ulceration of the intestines.

Following the ratio of St. Andrew, the deaths by ulceration of intestines in England should have been 30,000 per annum; and following that of St. Nicholas, they should have been 35,000 per annum, instead of 900!

Table, showing the number of deaths during 1866, from Ulceration of the Intestines, in each of the registration sub-districts of Newcastle-upon-Tyne.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	TOTALS.	Deaths to 100,000 persons living.
St. Nicholas & St. John ...	1	1	5	3		4	3	3	2		3	2	27	161
St. Andrew... ..			4	3	1	3		3	7	3		1	25	141
Byker				2	1	1	1	2			2		9	67
Westgate & Elswick ...	3	2	1	2	1	4	1	4	4		4	3	29	63
All Saints			2	1	1	2	2	1	1	2	2		14	48
Whole Borough	4	3	12	11	4	14	7	13	14	5	11	6	104	85

DEVELOPMENTAL DISEASES.

The developmental diseases of children and adults to the average of England as 12 to 99 and 5 to 11 respectively; but the disorders of nutrition as 300 to 104 in 100,000 persons living.

The diseases of this class have already, to a great extent, incidentally been considered; for many of the diseases of children, though not placed in that class, were developmental diseases. They account for 581 deaths, or in the proportion of 417 to 100,000 persons living, that for all England being 359. The developmental diseases of children and adults were much below the average of England, being the former as 12 to 99, and the latter as 5 to 11 in 100,000. But this advantage is more than counterbalanced by the disorders of nutrition which were nearly three times more fatal in Newcastle than in England as a whole, the respective proportions to 100,000 persons living being 300 and 104. The 363 deaths by disorders of nutrition, were mostly of children. The unsanitary condition of the town, the wretchedness and squalor in which many are reared, the artificial modes of feeding which are so much in vogue, must be regarded as powerfully determining causes of the high mortality of those diseases.

A review of the whole facts leaves no doubt that the excessive mortality of 1866 depended upon the general insalubrity of the borough.

There are still many important problems as to the relative distribution of disease in the five registration sub-districts of the borough, which can only be solved by a comparative analysis of the death-rate over several years; yet the investigation, so far as it has proceeded, proves beyond a doubt that the excessive mortality of the past year depended largely upon a wide distribution of sanitary evils throughout the borough, of varying, but generally of great intensity in its different districts.

	Died in Newcastle during 1866.	Should have died in Newcastle had the death-rate been according to the mean annual mortality of England in 1850-64.	Excess of deaths in Newcastle during 1866, compared with the average of England
528 persons died of zymotic diseases, 184 of constitutional, 349 of local, 143 of developmental, 26 from violence, and from all causes, 1242, who should have lived, had the death-rate of Newcastle in 1866 not exceeded the average of England.	Scarlatina . . . 500	... 130	... 370
	Bronchitis and Pneumonia 422	... 314	... 108
	Phthisis . . . 400	... 325	... 75
	Atrophy and Debility . 363	... 126	... 237
	Convulsions . . . 232	... 159	... 73
	Typhus . . . 224	... 111	... 113
	Tabes Mesenterica . 172	... 32	... 140
	Heart Disease . . 144	... 100	... 44
	Diarrhœa . . . 123	... 97	... 26
	Accident or negligence . 115	... 85	... 30
	Measles . . . 105	... 52	... 53
	Ulceration of Intestines . 104	... 5	... 99
(ORDERS.)			
	Zymotic diseases . . 1145	... 617	... 528
	Constitutional . . . 716	... 532	... 184
	Local . . . 1342	... 993	... 349
	Developmental . . . 581	... 438	... 143
	Violence . . . 123	... 97	... 26
ALL CAUSES	- - 3950	... 2708	... 1242

The mere fact that 1242 persons died in Newcastle during 1866, who would have lived if the death-rate had been

according to the mean annual mortality of England for the fifteen years, 1850-64, is in itself enough to awaken thought and stimulate exertion. Eliminating the deaths of non-residents who died in Newcastle during 1866, and distributing the deaths in the public institutions, to the different sub-districts of their residence, we find that, taking the mean annual mortality of England as a standard of comparison, the deaths in All Saints were 1100, and should have been 637, an excess of 463; the deaths in Byker were 429, and should have been 293, an excess of 136; the deaths in St. Nicholas and St. John were 520, and should have been 369, an excess of 152; the deaths in St. Andrew's were 520, and should have been 391, an excess of 129; while the deaths in Westgate and Elswick were 1310, and should have 1005, an excess of 305.

In all Saints the deaths were 463 in excess of the average of England.

On a review of the whole evidence it is impossible to resist the following conclusions:—

1. That, in common with most other large towns, the public health of Newcastle suffers from the overcrowding of houses on its built area, from external atmospheric pollution, and from moral, social, and economical influences.

Sanitary evils common to Newcastle with the large town.

2. That, as compared with other large towns, the average mortality of this borough is abnormally high, and that the principal causes of its abnormal death-rate are the very imperfect drainage of its clayey subsoil, the great numbers of its unpaved and unsewered streets, the want of drainage and of ashpit and privy accommodation, and the great extent of the sanitary neglect disclosed by the recent inspection.

Causes of the abnormal death rate.

3. That in every class, and order of disease, and almost in every single malady the mortality of Newcastle during the past year has been greatly above the average, and that the determining cause of this high death-rate was a great excess of overcrowding, the result of a diminution of house-building, and of the removal, for purposes of public improvement, of a large number of tenements occupied by the labouring poor.

Excess of overcrowding the determining cause of the high death rate of 18.6

THE MONEY COST OF DISEASE.

No arguments should be required to induce the hearty co-operation of all classes in enlightened and persevering efforts to improve the public health. The work is one as vast in its importance as in its magnitude. Wrapt up with it are the lives and happiness of thousands. Dull and commonplace it may appear in its dry details; but it touches the deeper springs of being. Underlying the growth and progress of society, it forms the basis of education, and even of higher culture. If it is noble to restore life, it is still nobler to guard it. In all ages, to relieve human suffering has been thought one of the worthiest tasks of life; it must be worthier still to prevent that suffering. To use all lawful means to preserve the lives of others is not only the instinct of nature, but the dictate of a higher charity. Those who labour for

The importance of sanitary reform not to be estimated by the money cost of disease.

Health lies at the basis of education, of moral and social culture, and of national prosperity.

Freedom is impossible to a physically degenerate race.

To prevent widowhood and orphanage is a higher office of Christian charity to succour them.

If the rich neglect the poor they must expect to suffer.

Heavy poor rates are a part of the penalty to be paid for sanitary neglect.

Money cost of typhus, 1863-66

Fever Hospital £1686.

Funerals £210 10s.

Loss in weekly wages £14,000

the moral and social elevation of the people, must not forge their health and homes. The future destinies of our country largely depend upon a greater attention to the laws of health. A physically degenerate race cannot long be freemen. Feeble in intellect and incapable of culture, they must become slaves. Patriotism and religion both should stimulate us to untiring efforts to sweep away the sanitary evils of our town.

To succour the widow and the orphan has ever been considered one of the highest offices of Christian charity, but to preserve to his family the husband and the father is a still higher office. Nor should it be thought unworthy of the highest and holiest in the land to help in this work. To attend to matters of drainage, sewerage, and sanitary police may seem to be drudgery; but the sacredness of the object, the preservation of human life, will "make the drudgery divine."

Interest leads where duty points the way. The epidemics which are generated in the squalid abodes of poverty, sometimes reach the homes of the rich. We cannot live to ourselves. If one member suffers, all suffer. Considering the sacredness of life, it seems an impertinence to speak of the cost of disease. Yet as it is often urged that sanitary reform is costly, it may be useful to look at the other side of the picture. More than all that is saved by sanitary neglect is lost in the penalties that we pay for such neglect. It is a foolish and false economy to tolerate the rank nuisances that poison so many of the people, on the ground that local taxes are already excessive. With a wise and prudent administration of our corporate resources, many of them could be removed without increasing our municipal burdens, but if it were necessary to levy a higher sewer rate, its intelligent application to sanitary purposes would soon make itself felt in a diminution of the poor-rate. It will be found most economical to do right.

There is nothing so costly to a community as disease, and yet few things of which it is so difficult to form an adequate estimate. The amount expended by the Board of Guardians on account of the epidemic of typhus from 1863 to 1866, is £1686 8s. 6d. in treatment of cases at the Fever Hospital, and in funerals, £210 10s. A return of deaths from typhus and typhoid fever shows that of males above 20 years of age, 27 died in 1863, 36 in 1864, 74 in 1865, and 87 in 1866, making a total in the 4 years of 224 persons, mostly earning weekly wages, and upon whom families were dependent, who died during the typhus epidemic. For one death there have been at least 8 illnesses; thus, 1792 adult males have been laid aside from work for periods varying from four to twelve weeks. Taking eight weeks as an average, and estimating the average wage at 20s. per week, we have a loss in weekly wages alone of upwards of £14,000. The total number of deaths during the epidemic of typhus, from 1863 to 1866, is

620. It would be difficult to compute the loss which the community sustains under that head. The total number of cases of fever reported in the medical officer's books of the Union, from 1863 to 1866, is 1541; and estimating the weekly relief given during the progress of the disease at twenty shillings, we have £1540 as the amount expended in the temporary relief of such cases. The number of widows becoming permanently chargeable on account of the death of their husbands by typhus, is 134, with 340 fatherless children at an annual charge of £1,846, which, supposing it to continue for five years, will amount to £9,230. There are 28 poor children, from whom typhus has snatched away both father and mother, and who, for many years, will be chargeable to the relief fund. From these general data, we may roughly estimate the money cost to the community of the epidemic of typhus, 1863 to 1866, at £23,000. As a further illustration of the cost of such diseases, we may state, that during a previous epidemic of typhus in Newcastle, the number of persons receiving relief rose nearly 1000, and the expenditure increased £3,400 in one year.

Temporary relief
£1450.

Widows, orphans
£9,230

Making a total
of £23,000

Previous to the second visitation of cholera the cost of out-door relief in the Newcastle-upon-Tyne Union was £15,948; but as the result of that epidemic, and of the prevalence of typhus, the annual cost of out-relief rose to £21,826, no fewer than 7,140 persons having received relief, or 1 in every 14 of the estimated population. These two epidemics levied an additional poor rate of nearly 6d. in the pound, apart from all that they cost in other respects.

A previous epidemic of typhus, and cholera caused a rise in annual charge of £6,000.

So much for epidemics. We have yet to estimate the cost of disease which goes slowly on, but does not rise up suddenly into great proportions. During the half-year ending 29th Sept., 1866, there were 8089 persons in the Newcastle-upon-Tyne Union who received out-door relief, at a cost of £9,966 13s. 11d. Of these there were 450 adult males who were relieved on account of their own sickness, and 64 relieved on account of the sickness of some member of their family. Dependent on those adult males, there were 359 wives and 913 children, at a cost of £2232 for the half-year, exclusive of medical relief. During the same period, 737 widows, with 1707 fatherless children, received out-door relief, at a cost of £3055 for the half-year. There were also 202 orphans receiving out-door relief at the same period, while 170 widows, with 288 orphans, obtained relief in the Workhouse. From £13,000 to £15,000 per annum must be regarded as the amount which disease and death levy upon us in the shape of poor-rate, and one-third of that must be placed to the account of zymotic disease. Many constitutional diseases must, however, be traced up to their origin in miasmatic diseases, phthisis, for example, we find exceedingly fatal among the classes who receive parochial relief; and often the seeds of this terrible malady are laid in an attack

Cost of ordinary cases of sickness £4464 per annum.

Cost of widows and orphans £6110 per annum exclusive of indoor relief for 170 widows and 288 orphans.

The annual cost of the out door pauper lunatics is £4730. 14. 6.

And the causes that combine to produce a high death-rate tend to increase insanity.

Crime is costly and the physical degradation produced by sanitary evils is productive of crime.

Over crowding is itself caused and to some extent depends upon intemperance.

of fever, or in the over-crowding and wretchedness which are its conditions and concomitants.

The payments by the Board of Guardians, on account of pauper lunatics, amounted to £2365 7s. 3d., for the half year ending the 25th March, 1867; or at the rate of £4730 14s. 6d. per annum. This is exclusive of the cost for maintenance of the harmless lunatics who are provided for in the Workhouse; and of the rate for the erection of the New Borough Asylum. The number of pauper lunatics is greatly on the increase; especially during the last year.* Where health conditions are not favourable, insanity prevails; and this is another part of the penalty which society has to pay for the neglect of the laws of health. Nor can it be doubted that under better sanitary conditions, there would be a decrease of mental alienation, and of all its sad fruits. In the regular course of the Poor Law administration, not less than £7000 per year might be saved by giving the people who live in our unhealthy districts more light, more air, and more comfortable homes.

Sickening as the recital is, it must be repeated that, in Newcastle, for 1866, there has been excessive mortality from almost every disease "that flesh is heir to," that the poor have suffered most; and that the mere money fine is a high poor-rate.

NEED FOR FURTHER ENQUIRY.

Fairly to estimate the money cost of disease, it is necessary to consider to what extent the physical degradation, engendered by sanitary evils, is productive of crime. And our municipal authorities, on the eve of a fresh demand for increased prison accommodation, would do well anxiously to enquire into the causes that have led to that demand. The simultaneous increase of disease, mortality, pauperism, insanity, and crime, is a beacon to which rulers and people would do well to take heed, if on no other ground, than that of economy. But the continued increase of suicide; of crimes against law and order; the monstrous precocity of young criminals; the demand for greater accommodation in our asylums and prisons, only too plainly indicate a degeneracy of race, which if not arrested, is the sure precursor of national decay.

Although the moral and social causes of high mortality do not come within the scope of your sub-committee's inquiry, it cannot be doubted that the intemperate habits of many of the inhabitants of our densely crowded localities, tend to produce destitution, overcrowding, and physical wretchedness, to predispose to disease, and to lead to neglect of children, thus increasing mortality; and an enquiry into the influence which our licensing system has upon the moral and social habits of the people, would throw much light upon the question of our high death rate, and upon the increased pauperism, insanity, and crime of the past year. A sub-committee

* Appendix.

of the Health Committee of the Borough of Liverpool, appointed to enquire into the causes of the excessive mortality of that city, arrived "at the conviction, supported by a mass of evidence, that the proximate causes of their increased death-rate were intemperance, indigence, and overcrowding; these two latter being generally found in the train of intemperance, although all three act and react on each other as cause and effect." In Newcastle the relative force of these causes may be somewhat different; yet it is only too evident that "intemperance is very prevalent, and that its wretched victims and their families sink rapidly into squalid poverty, resulting in overcrowding and its attendant evils."

It is important to ascertain what influence the present licensing system exerts upon the habits and through them upon the health of the people.

REMEDIAL MEASURES.

No one class in the community can be held responsible for the state of things which has fostered epidemics, and raised Newcastle to the unenviable notoriety of being, for some months past, the unhealthiest town in England; but as we are all more or less blameworthy, so it must be by the earnest and hearty co-operation of all classes that the evil has to be remedied.

As all classes are more or less responsible for the evils, it is their duty to co-operate in efforts to remove them.

HOW THE POOR CAN HELP THEMSELVES.

For the prevention and arrest of epidemics much must always depend upon the poor themselves. Self-help is here the truest help. No elementary education should be considered good that does not embrace a knowledge of the simplest laws of health; and yet there are few subjects upon which so much ignorance prevails. Some plain hints on the means of preventing typhus, and of disinfecting houses where miasmatic diseases have existed, your sub-committee do not deem out of place.

Much must always depend upon the poor themselves.

PLAIN HINTS ON THE MEANS OF PREVENTING TYPHUS.

1. Care should be taken to have sufficient air space to breathe in. Each person should have at least 500 cubic feet. A room 10 feet long by 10 feet broad and 10 feet high, is only suitable for two people. What is saved in rent is lost in sickness.

Their rooms should be large and airy.

2. Where overcrowding exists, no time should be lost in informing the sanitary authorities; for impure air may give wings to a pestilence, that will soon destroy more lives than fall on a battle-field.

They should inform the authorities of any overcrowding.

3. Every room should be ventilated at least twice a day. To renew the air, doors and windows should be thrown widely open, and in fine weather the window should be kept always open at the top.

Their rooms should be well ventilated.

4. The utmost cleanliness should be observed in the room. Nothing that offends the sense of smell should be there. Dirty clothes should not be allowed to accumulate. The boards should be well rubbed with a damp flannel, and well dried,

They should keep their rooms and bedding perfectly clean.

twice a week. The bedding ought to be thrown open, and exposed to the air on rising, and left some time before it is covered up again.

The whole body
should be
washed.

5. The whole body should be washed with warm water and soap at least once a week, and the children daily. The clothes should be changed at night. It is a bad plan for a man to wear the same shirt night and day. It is not more expensive to change, and it is much more healthy.

Temperance in
eating and
drinking
should be
observed.

6. Temperance should be observed in eating and drinking ; and all those habits of sobriety, regularity, industry, and self-control should be cultivated, which so largely tend to improve health, and to ward off disease.

RULES TO BE OBSERVED WHERE FEVER EXISTS.

Where typhus
exists windows
should be open.

1. It is of the utmost importance to the sick and their attendants that there be a constant admission of fresh air into the room, and especially about the patient's bed, care being taken to prevent the wind from blowing directly on the fever patient.

Cleanliness is
indispensable.

2. Attention to cleanliness is indispensable. The linen of the patient should be often changed, and the dirty clothes, &c., immediately put into hot water, and afterwards well washed. The floor of the room must be cleansed every day with a mop, and all discharges from the patient removed, and the utensils washed.

Infection to be
guarded
against.

3. Nurses and attendants ought to endeavour to avoid the patient's breath, and the vapour from the discharges.

4. Visitors must not go near the sick, nor remain with them longer than is absolutely necessary ; they should not swallow their spittle, but clean the mouth and nostrils when they leave the room.

No reliance must
be placed on
vinegar or
camphor.

5. No dependence must be placed on vinegar, camphor, or other supposed preventions, which, without attention to cleanliness and admission of fresh air, are not only useless, but, by their strong smell, render it impossible to perceive when the room is filled with bad air or noxious vapours.

PROCESSES OF DISINFECTION.*

Fresh air for the
room, and hot
water for
clothes and
furniture are
among the
best disinfectants.

These processes are not intended to supply the place of cleanliness, ventilation, and drainage. They are artificial, and are used for exceptional purposes ; the great natural disinfectant being *fresh air*, abundantly and uninterruptedly supplied.

Nor must it be forgotten that in *hot water*, which every housewife can get without cost or trouble, we have one of the safest and most powerful of disinfectants.

Agents of artificial
disinfection.

1. For purposes of artificial disinfection, the agents which most commonly prove useful are chloride of lime, quicklime, permanganate of potash, and carbolic acid. Metallic salts, especially perchloride of iron, sulphate of iron, and chloride of

* Recommended by Professor Miller, of King's College, London.

zinc, are under some circumstances applicable. In certain cases chlorine gas or sulphurous acid gas may advantageously be used; and in certain other cases powdered charcoal or fresh earth.

2. If perchloride of iron or chloride of zinc be used, the common concentrated solution may be used in the preparation of a pound to a gallon of water, taking care that the water completely dissolves the sulphate of iron, or has the chloride of lime thoroughly mixed with it. Condyl's stronger fluid (red) may be diluted with fifty times its bulk of water; his weaker fluid (green) with thirty times its bulk of water. Where the matters requiring to be disinfected are matters having an offensive smell, the disinfectant should be used till the smell has entirely ceased.

Perchloride of iron, chloride of zinc, or Condyl's fluid may be used to remove offensive smells.

3. In the *ordinary emptying of privies* use may be made of perchloride of iron, of chloride of zinc, or of sulphate of iron. But when disease is present, it is best to use chloride of lime, or Condyl's fluid. Where it is desirable to disinfect before throwing away the evacuations from the bowels of persons suffering from certain diseases, the disinfectant should be put into the night-stool or bed-pan when about to be used by the patient.

Excreta may be disinfected by chloride of lime.

4. *Heaps of manure*, or of other filth, if it be impossible or inexpedient to remove them, should be covered to the depth of two or three inches with a layer of freshly burnt *vegetable charcoal* in powder. Freshly burnt lime may be used in the same way, but is less effectual than charcoal. If neither charcoal nor lime be at hand, the filth should be covered with a layer, to the depth of some inches thick, of clean dry earth.

Heaps of manure by a few inches of clean dry earth.

5. *Earth near dwellings*, if it has become offensive or foul by the soakage of decaying animal and vegetable matter, should be treated on the same plan.

Earth by a layer of vegetable charcoal.

6. *Drains and ditches* are best treated with chloride of lime or with Condyl's fluid, or with perchloride of iron. A pound of good chloride of lime will generally well suffice to disinfect 1000 gallons of running sewage; but of course the quantity of disinfectant required will depend upon the amount of filth in the fluid to be disinfected.

Drains and ditches with chloride of lime

7. *Linen and wearing apparel*, requiring to be disinfected, should, without delay, be set to soak in water containing, per gallon, about an ounce either of chloride of lime, or of Condyl's red fluid; the latter, as not being corrosive, is preferable. Or the articles in question may be plunged at once into boiling water, and afterwards, when at wash, be actually boiled in the washing water.

Wearing apparel by boiling water or Condyl's red fluid.

8. *Woollens, bedding, or clothing*, which cannot be washed, may be disinfected by exposure for two or more hours, in chambers constructed for the purpose, and heated to a temperature of 210° to 250° Fahr.

Bedding by heat.

Walls and ceilings with quicklime.

9. For the disinfection of *Interiors of Houses*, the ceilings and walls should be whitewashed with quicklime. The wood-work should be well cleansed with soap and water, and subsequently washed with a solution of chloride of lime, about two ounces to the gallon.

A room no longer occupied, by burning sulphur.

10. *A room no longer occupied* may be disinfected by sulphurous acid gas, or chlorine gas; the first, by burning in the room an ounce or two of flowers of sulphur in a pipkin; the second, by setting in the room a dish containing a quarter of a pound of finely powdered black oxide of manganese, over which is poured half a pint of hydrochloric acid, previously mixed with a quarter of a pint of water. In either case the doors, chimney, and windows of the room must be carefully closed during the process, which lasts for several hours.

DUTIES OF OWNERS OF PROPERTY.

Owners of tenements' are bound to put them not only in a habitable, but in a healthy state.

Owners of tenements should realize that property has its duties well as its rights, and without being compelled by the arm of the law, they should exert themselves to remedy many of the serious defects which have been pointed out. With their own eyes they should see the condition of their tenants, and hear their complaints; nor should a selfish economy hinder them. However much mere pecuniary considerations may tend to blind men's judgments, and blunt their feelings, it would be unjust to suppose that the owners of the worst description of tenements realize the extent to which they are responsible for the destruction of human life. Drawing their rents through agents, they never come in contact with the physical horrors disclosed by the recent sanitary inspection. The filth and fever which fester in their property are either not known at all, or only through a newspaper report, which they are likely to consider one-sided and exaggerated. Could they for once be induced, by personal inspection of their property to get more than a dim abstract idea of its condition, many well-meaning proprietors would feel the responsibility of their ownership, and would either themselves undertake the work of sanitary improvement, or would empower others to do so. It would then require no reasoning to convince them that subscriptions to charitable institutions are but a poor compensation for neglect of the first duties of property, and go but a small way to dry up the stream of misery produced by such neglect. Where such considerations produce no salutary effect the Corporation need have no hesitation in applying the powers which the recent sanitary Act gives them to compel the owners to put their property in a habitable and sanitary state.

They should personally inspect their tenements.

And if they refuse to improve their property, they should be compelled to do it by the Corporation, under the powers of the new sanitary act.

LOCAL SANITARY ASSOCIATIONS.

It is not indifference, so much probably as ignorance, that, on the part of the public, has tolerated the growth of those

gigantic sanitary evils, from which Newcastle has suffered, and is still suffering. The higher and middle classes should not be content with eleemosynary charity, but should feel their responsibility occasionally to mingle with their poorer brethren, cheering them with their sympathy, and aiding them with their counsel. To dole out relief at our doors to the poor neglected Arabs that prowl about our streets, is only helping to initiate them into a life of pauperism or crime. Could they for a few hours a day be subjected to sound discipline and culture, the experience of our Ragged and Industrial school warrants the belief, that they would soon carry into the mass of evil around them those germs which would tend to leaven it, and restore it to health and peace. Nor must it be supposed that to relieve their parents, however liberally, when they apply for parish relief, or when they beg at our doors, will do any thing to bridge that frightful chasm which now separates them from the rest of society. There is a broad and deep stratum, scarcely touched by the various philanthropic and religious movements of our day; and which cannot be much raised in the scale of being, until its condition and circumstances are better understood. And to that result the vigorous and intelligent operation of local sanitary associations would greatly contribute.

Local Sanitary Associations would be productive of good.

The danger of relieving children that beg at our doors. It would be infinitely better to send them to school,

HOUSE-TO-HOUSE VISITATION.

Foremost among means of present utility and urgency stands house-to-house visitation. Nothing short of this will familiarize the public mind with the vast problem which has to be solved, and the mode of its solution. The wants, the difficulties, and the temptations of the poor would become better known to those who have the means of helping them; and not the least advantage of such frequent intercourse would be a feeling of mutual respect and sympathy. The organization of a system of visitation should rest with the Public Health Committee, composed of members of the Town Council, Guardians of the poor, and representatives of the Medical Society. There would thus be gathered into a focus all the information on the subject, with all the machinery for dealing with it. All Saints' is already mapped out into eight sub-divisions,* and the manifest advantage that would result from a commencement of the system there, would speedily lead to its adoption throughout the whole borough. It would enable the official staff to grapple with an epidemic at its outset, and to concentrate their efforts upon the point of danger ere it was too late. Under the direction of the medical officers of health, in some of our large cities voluntary house-to-house visitation has proved of essential service in the arrest of epidemics and the removal of conditions prejudicial to the public health, nor can it be doubted that it is equally practicable, and under efficient management, would prove no less useful, in this borough.

House-to-house visitation would awaken fresh thought and interest among those who can help the poor.

In other large towns it has resulted in great sanitary improvements.

* Appendix XVIII.

GUARDIANS OF THE POOR.

Guardians should specially investigate all cases of sickness.

1. It has been seen that a very large amount of pauperism is dependent upon sickness, and it is not the least important of the duties of Guardians of the poor carefully to investigate such cases, and to order special relief. A liberal allowance in sickness is often the truest economy. Medicine will have but a poor chance without suitable food and clothing. A good dinner, even once a week, would form an epoch in the history of many poor children; and would probably save many lives.

Special reports should be obtained from the medical officers of persons permanently disabled.

2. The whole question of medical relief deserves thorough enquiry. A great number of persons are returned by the relieving officers as permanently disabled, but who are under no medical treatment. The attention of medical officers should be directed to such cases, that they might specially report as to the best means of restoring them to health. In many instances it will be found that permanent debility depends upon the unsanitary condition of the home, and that a change for a short time to the country, and a healthier dwelling, would soon restore the bread-earner to vigour, if not to independence.

The Union medical officers should be encouraged to draw the attention of the Board to matters affecting the public health.

3. The Union medical officers, in the discharge of their onerous and responsible duties, become conversant with facts which demand the special consideration of the Board of Guardians; and they should be encouraged to report such facts, from the conviction that every suggestion which they may make, will receive the attention which it deserves. Important as this must be at all times, it is especially so at the outbreak of an epidemic.

Their salaries might be increased so that they might give attention to the sanitary improvement of their districts.

4. In view of the heavy tax levied upon the ratepayers by preventable disease, it seems to your sub-committee worthy of the consideration of the Guardians of the poor, whether it would not be economy to increase the salaries of the medical officers, so that they might give attention to the sanitary improvement, not only of the houses which they visit, but of the whole of the tenement property of their respective districts.

To meet the feelings of the poor it might be well to allow fever patients to be attended in district hospitals by their own medical man.

5. Although the services of the Fever Hospital authorities, and especially the self-denying and unpaid labours of the physicians of that Institution are beyond all praise; yet it cannot be doubted that the attachment which the poor form for their own medical man, with other circumstances, acts as a powerful obstacle to the removal of fever patients to hospital, and also to the isolation and disinfection so necessary to arrest the progress of contagious and infectious diseases; and your sub-committee would suggest that that obstacle would be removed, and these important results more readily attained, by allowing the medical officers of the Union, and, under certain regulations, other duly qualified practitioners, to attend their own cases in district or other hospitals for infectious and contagious diseases, under the general superintendence of a physician, who should be remunerated for his services.

6. As a very considerable amount of out-door relief in this Union is dependent upon imperfect recovery from acute diseases, as well as from debility produced by overcrowding and other unsanitary conditions, it appears worthy of the consideration of the Board of Guardians, whether an arrangement could not be made with the managers of the sea-side Convalescent Home, by which, under the order of the Union medical officers, the patients receiving out-door relief, whom they deemed fit, might receive the benefits of that valuable institution.

Many persons receiving out-relief on account of debility would be greatly benefitted by the sea-side Convalescent Home.

7. There are other patients whom it would not be desirable to send to the sea-side, but to whom a purer and fresher air, than that to which they have been accustomed in their overcrowded dwellings, would be a renewal of life, and your sub-committee would suggest the importance of providing a convalescent ward for such cases in the new Workhouse Infirmary, which the Guardians have wisely resolved to build.

A convalescent ward in the new Workhouse Infirmary might be provided for those whom it would not be advisable to send to the sea-side.

8. Accurate statistics are the basis of all true sanitary reform, and the Guardians have it in their power to contribute data of great value in the collection of such statistics.

As the worst places are known to the Union Medical Officers and the Union Relieving Officers, it is to the Guardians of the poor and their officials that the public must look for the earliest information as to the first cases of miasmatic diseases. Charged with the relief of destitution occasioned by sickness and premature mortality, and with the supervision of the Medical and Relieving Officers, Guardians should not feel that they are out of their province in collecting such information; and inasmuch as the proposed course of action, by averting or lessening the mortality from miasmatic diseases, will prevent claims for relief on account of widowhood, orphanage, and premature disability, the necessary incidental expenses may be fairly charged on the poor's rate. The following are recommended by Poor Law Guardians and other authorities as the best means of collecting such information:—

Guardians have it in their power to contribute data of great value in the collection of sanitary statistics.

(a.)—Medical and Relieving officers to mark on maps of their districts the places they have had occasion to visit for diseases of the miasmatic class.

The spots where miasmatic diseases are known to prevail, as well as where they prove fatal, should be marked on district maps.

(b.)—The Union clerk, as superintendent registrar, or his deputy, should mark on the same maps the places from which deaths from miasmatic diseases have been registered.

(c.)—The seats of diseases of the miasmatic class should be marked with red ink; and of death with crosses in black ink; and the places where cases of cholera have occurred should be marked with blue ink.

Medical and Relieving Officers should be requested to make notes on the condition of such places, and of spots undrained or badly drained.

(d.)—The Medical and Relieving Officers should be requested to make notes and observations on the condition of the places affected by miasmatic diseases, and the classes of persons who suffer most from them.

The district maps thus marked should be transferred to a general map of the Borough.

(e).—The courts, alleys, and other places which are undrained, or badly drained, and which have no proper water-closets, privies, or self-cleansing house drains or sewers, and no proper pavement, should be marked on the proposed district map.

(g).—The district maps, or copies of them, should be sent to the Public Health Officer, by him to be transferred to a general map of the whole borough, on the largest scale of the ordnance survey.

(h).—In aid of such maps, the chief seats of the miasmatic diseases should be accompanied by lists, with observations by the Registrars or other Union Officers.

THE TOWN COUNCIL.

Chief responsibility rests with the Council.

The chief responsibility for the sanitary improvement of the borough rests with the Corporation, because in it is vested by law the power of dealing with the numerous and gigantic sanitary evils disclosed by the recent inspection.

There are many suggestions already made in this report which your sub-committee do not deem it necessary here to recapitulate, but which are none the less deserving of attention.

The first duty is to consider how best to give effect to the provisions of the Sanitary Act.

To enter into all the details of sanitary work practicable and necessary, would be to recite almost every clause of the Sanitary Act of 1866; and the very first duty of the Public Health Committee, when entrusted with full powers by the Corporation, should be to consider how best to give effect to the provisions of that Act.

The water supply is, in some parts of the town, so visibly impure at times, that it requires no analysis to prove the necessity for better filtration.

The water supply of the borough is under the care of a special committee of the Council; and although that committee has reported favourably both as to quantity and quality, it appears to your sub-committee that so long as living creatures, visible to the naked eye, come from our water taps, it requires no analysis to prove that the more effective filtration of the water supply still demands the attention of the Water Company.

When there are so many facilities for the production of pure and cheap gas, the standard of purity should not be lowered below that of other towns.

Like the water, the gas supply of the borough is under the care of a special committee of the Corporation, and your sub-committee hope that, in a district where there are so many facilities for the production of pure and cheap gas, it will be recognized that the standard of purity should not be permitted to fall below that of other large towns, and that in its manufacture means may be found for preventing the escape of those acid and noxious fumes, which have recently been such a source of discomfort, if not of injury, to the inhabitants of Elswick.

I. PUBLIC HEALTH COMMITTEE.

Your sub-committee would suggest the desirability of placing in the hands of a Public Health Committee full

powers, and of constituting it the sanitary authority in terms of the Sanitary Act. In the 4th clause of the Act 29 and 30 Vict. cap. 90, power is given to the Town Council, as the sewer authority for the borough, to form a Public Health Committee partly of its own members, and partly of other persons being ratepayers in the borough. The following are the terms of that clause:—"Any sewer authority may from time to time, at any meeting specially convened for the purpose, form one or more committee or committees, consisting wholly of its own members, or partly of its own members and partly of such other persons contributing to the rate or fund out of which the expenses incurred by such authority are paid, and qualified in such other manner as the sewer authority may determine, and may delegate, with or without conditions or restrictions, to any committee so formed all or any powers of such sewer authority, and may from time to time revoke, add to, or alter any powers so given to a committee."

The Public Health Committee should be constituted the sanitary authority.

The Act 29 and 30 Vict. cap. 90 gives the Corporation power to appoint a Public Health Committee partly of persons who are not members of the Council; and to dissolve such Committee or alter its constitution.

"A sewer authority may from time to time add to or diminish the number of its members, or otherwise alter the constitution of any committee formed by it, or dissolve any committee."

"A committee of the sewer authority shall be deemed to be agents of that authority, and the appointment of such committee shall not relieve the sewer authority from any obligation imposed upon it by Act of Parliament or otherwise."

These clauses prove that the legislature contemplated the possibility, if not the propriety, of finding persons other than members of councils, whose knowledge of the laws of health, and whose interest in sanitary matters would make their appointment upon a Health Committee a public advantage. Boards of Guardians, through their officers, possess the earliest information of the outbreak of any epidemic; the statistics of disease, furnished by the medical relief books, are the only reliable statistics of disease at present available, except those furnished by the medical charities and institutions of the borough; the granting of suitable relief to poor people who are sick is ever the earliest and most needed means of restoration; the experience of the medical staff of the union, and also of its relieving officers in ascertaining the seats of zymotic disease, and in ferreting out sanitary grievances and wrongs, would be of great value to the Health Committee; in the event of the erection of district Hospitals, the most suitable and economical arrangement would then be to place under the care of the medical officers of the union; moreover, under the direction of the Privy Council, very large powers are entrusted to Boards of Guardians in the event of any outbreak of cholera; nor are their means of information and of service of less value in the case of any other epidemic. On these and other grounds, it is desirable

It is desirable that the Board of Guardians, being charged with the relief of destitution occasioned by sickness, and having the means of supplying District Hospitals with medical aid, should be represented on the Public Health Committee.

that the Public Health Committee should be comprised partly of Guardians of the poor.

The addition to the Committee of some members of the medical profession would be a public advantage.

Members of the medical profession from their knowledge of the laws of health, and of the causation, prevention, and cure of disease, would be able to render invaluable service; and it needs no argument to prove that the addition to the committee of some members of the medical profession would be a great public advantage.

To secure control, the Town Council may appoint a majority of its members.

As the Town Council is the sewer authority under the act, it is fitting that a majority of the Public Health Committee should be members of the Corporation; it would thus secure sufficient control. Still there is no reason why it should be confined in its selection to such bodies. There may be ratepayers whose studies, habits, and pursuits would eminently qualify them for office on a Public Health Committee; and whose help it would be desirable to obtain.

Such an arrangement would not in the least interfere with the ordinary work of the Town Improvement Committee, but would be a division of labour, which, in the opinion of your sub-committee, would greatly facilitate sanitary improvement.

Such a body possessing accurate knowledge with full powers would soon inaugurate a new state of things.

A Public Health Committee, thus constituted, principally of members of the Council, and partly of Guardians of the Poor, members of the medical profession, and such other ratepayers of the borough as the Corporation may from time to time think fit to appoint, would possess a comprehensive and accurate knowledge of the sanitary necessities of the town, with all the authority required to supply those necessities. Full knowledge, with full powers, under the guidance of a sincere desire to improve the public health, would soon make themselves felt.

The public should be placed *en rapport* with the Health Committee; its meetings therefore, should be open to the press.

As it is important, in order to secure their hearty co-operation, that the public should be fully informed of the measures adopted to remedy the sanitary evils of the town, and no less important that they should be encouraged at once to report any nuisance, or case of contagion; the utmost publicity should be given to the proceedings of the Public Health Committee, and its meetings should be open to the representatives of the press.

II. A MEDICAL OFFICER OF HEALTH.

A Medical Officer of Health should be appointed whose duty it would be, under the direction of the Sanitary authority, to advise and superintend all measures of sanitary improvement.

Your sub-committee would respectfully recommend the appointment of a Medical Officer of Health, whose special duty it would be to analyze the vital statistics of the borough; to supplement those statistics with inquiries which would make them of greater public utility; more fully to investigate the distribution and causation of disease in the various sub-districts; to co-operate with the Medical Officers of the Union in any plans which may be considered fitted to check prevalent forms of disease; to advise the sanitary authority on all questions affecting the public health; to superintend the

measures that may be necessary in case of epidemics ; to advise with the Inspectors of nuisances and the other officers of the Corporation on questions relating to hygiene ; to guide the house-to-house visitation ; from time to time to make analyses of the gas and water ; to report on all these matters to the Council, and generally to be responsible for the sanitary work done by the Corporation. The appointment of such an officer in other large towns has been of great advantage.

III. REARRANGEMENT OF DISTRICTS.

From the diverse and conflicting ways in which the borough has been divided for different purposes, the difficulties encountered in this enquiry have been all but insuperable, and many important questions, affecting the public health, have not only not been answered, but no attempt has been made to answer them. This has arisen not so much from a want of data, as from the impossibility of accurately comparing these data within given areas. If further evidence were required that thoroughness and comprehensiveness must not be expected in the sanitary arrangements of the borough, until they are guided by a responsible head, it is found in the fact that the information, valuable and important as it is, obtained by the recent sanitary inspection, was collected in such a form, that it could not be applied, except in the most general way, to the elucidation of the death-rate for the past year ; and that it was necessary to rely upon other, though not less reliable sources, for the data, rendering it possible to compare the zymotic death-rate with the number of tenements in each of the sub-districts. At present the boundaries of parishes, wards, relief districts, medical districts, police districts, all differ more or less from each other, and from the registration sub-districts ; nor is there any principle upon which they have been constituted. What is needed is such an arrangement as would render it possible, if not easy, to collect and compare the statistics of pauperism, crime, insanity, education, house accommodation, and sanitary inspection, with each other, and with the vital statistics of the borough. Wise sanitary effort largely depends upon full and and precise knowledge ; such knowledge is not to be obtained without statistics ; and statistics to be comparable must be the fruit of a system. Accurate sanitary statistics, forming the natural history of a population, would be of the greatest value, in all efforts to improve the public health. To accomplish this it is not necessary that the districts for all purposes should be of uniform size, all that is needed is the adoption of a uniform basis, and such a basis is readily found in the census enumerator's districts, or similar small areas, containing a population from 3000 to 4000 ; the districts for out relief, for medical relief, for police purposes, and so forth being made up, as convenience or necessity might dictate, of

The registration sub-districts are not continuous with others. Hence the difficulty of comparing sanitary data with the death-rate.

It is important to compare the statistics of pauperism, crime, insanity, education, house-room, sanitary, inspection, with vital statistics.

The census enumerator's districts, or similar areas would form a convenient basis for a re-arrangement of districts.

a variable number of these unit-areas. Your sub-committee would therefore, recommend that the census enumerator's districts, or similar areas, form the basis of a re-arrangement of the borough for statistical purposes, and that the statistics in each case be kept with regard to these smaller subdivisions.

IV. THE POLICE AUTHORITIES.

The police
should report
all nuisances.

The police having constantly to traverse all districts of the borough, and being well acquainted with those which are physically in the worst condition, the Watch Committee and Superintendent of Police should be requested to aid local inquiries, by directing each policeman to make out lists of the places, characterized by foul smells, by common nuisances, and by over crowded and badly constructed tenements; and that weekly tenements, and the like places, where over-crowding exists, in connection with disease, should be distinctly marked in the district maps; all such information being communicated to the Public Officer of Health.

V. THE DAILY REMOVAL OF REFUSE.

The daily removal of the solid refuse of the town is practicable, would render the conversion of privies into water-closets unnecessary, while it would be more economical and not less healthy.

Among measures of immediate applicability, your sub-committee would recommend the daily removal of the whole refuse of the town to depôts, where no one could be affected by its emanations. Instead of allowing it to accumulate in long lines of back streets, where it poisons both atmosphere and soil, it would be less costly, and it would be much more healthy, to remove it day by day. In the appendix will be found an account of the cleansing operations of the city of Edinburgh, and of the machinery by which the daily removal of all offensive matter is effected. That machinery is at once simple, economical, and efficient. The depôts, sufficiently removed from human habitations, are yet in convenient proximity to the various lines of railway, which supply a circuit of fully twenty miles of extent; and the refuse is in such demand by the farmers as manure, that it is at once carted from the streets direct to the railway, and hence the depôts are generally empty. By the adoption of this or of similar machinery, it would be practicable at once to do away with the midden system, which tends so much to pollute the air, and is fraught with such danger to the public health.

VI. SCAVENGING OF STREETS.

Scavenging should be done on a system, and that adopted by the city of Edinburgh is efficient without been costly.

In the opinion of your sub-committee a proper system of scavenging would conduce to the cleanliness, comfort, and health of the people. Each scavenger should be allotted a beat, for the cleaning of which he should be made responsible, overseers being appointed to take charge of the districts, and all being placed under the control of an inspector, who, in his turn, should be directly responsible to the council. The

contract to remove the refuse from the streets should be exposed to public competition, and the person selected should be bound by penalties to conduct the cleansing operations within a given time. The system, described in the appendix, which has been so successful in the city of Edinburgh, seems worthy of adoption in this borough. However humble it may appear, it would be a valuable sanitary work frequently and thoroughly to cleanse and dry the streets. The present expedient by which the occupiers of houses are required to clean the pavement in front of their own houses is as unjust as it is inefficient. Householders who pay rates have a right to expect that the purification of the whole thoroughfare from frontage to frontage should rest with the corporation, for the pavement is as much a part of the public street as the causeway. The scavengers should also be made responsible for watering the streets, and this could be much more efficiently, quickly, and economically done by hose from the fire plug than by water carts.

Scavengers should be charged to keep the foot-paths as well as the streets clean.

VII. PAVING AND SEWERING OF STREETS.

Five years ago there were, and there still are, about 200 streets in various parts of the town (but principally in the west end) unpaved and unflagged. The accumulation of decaying animal and vegetable matter in these streets, is a serious danger to the health of the town, and productive of a great amount of disease, especially in the autumn months. The cost of the work, as estimated by the Town Surveyor in his report of 1862, is £71,423, all of it recoverable from the owners of property; and your sub-committee consider that with due energy the whole work may be completed in two years, without at all increasing the borough rates.

With due energy the whole of the streets should be paved, within 2 years.

VIII. VENTILATION AND FLUSHING OF SEWERS.

The effective purification and ventilation of the sewers is a matter of great sanitary importance, otherwise the system of sewers, constructed with so much care and at so great a cost, may only harbour and hide the poisons we are trying to get rid of. Indeed, until the sewers are efficiently ventilated, every attempt more perfectly to trap the street gullies, by concentrating the foul gases of the sewers, only increases the danger to houses where the trapping is defective, especially in the higher parts of the town. It is better to let the foul gases escape where they can be diluted, than to force them into inhabited houses. Water-closets are objectionable for negligent people; and even if it were proved that sewers provide the best means of removing solid refuse, it is not desirable to give them more to do until they are efficiently ventilated or cleansed.

It is of great importance to ventilate and purify the sewers, and until that is accomplished, the extension of the water-closet system is undesirable.

To attain this object, various measures have been adopted. In London, although the side gutters are trapped, there are

Openings may be left from the top of the sewer to the centre of the street; charcoal may be used; the smaller drains may open without a trap into the rain-water spouts; and the largest drains may be ventilated by the Archimedean screw ventilator.

The great point is to remove the organic impurities which are the cause of foul air.

By husbanding the water that now runs to waste in different parts of the town, it would be easy to flush the sewers.

The want of effective subsoil drainage seen in the high death-rate from diarrhoea and consumption.

untrapped openings from the top of the sewer to the centre of the street. Charcoal in the concrete state has been used as a condenser of the foul gases issuing from sewer gullies, but, from its great affinity for watery vapour, it does not act so well as a deodorant in damp as in dry situations. The rain-water spouts, when above the highest windows of the house, have been directly connected with the sewer without a trap, and thus the branch drains have been ventilated and cleansed; while in the largest drains and mains, constant and effective ventilation has been secured; by a very simple apparatus called the Archimedean Screw Ventilator. It has also been proposed to ventilate the chief lines of sewers by connecting them with large chimneys, and to consume the gases as they escape in our public furnaces. At best, however, the ventilation of sewers must only be regarded as a measure of safety, in the event of diminished or intermittent water supply.

With due regard to the experience which has been arrived at in other large towns, where the sewer system has been greatly developed, your sub-committee consider, that, after some experiments, which need be neither elaborate nor costly, an effective plan of ventilation may be devised applicable to the sewers of this borough; but it appears even more important to remove, as far as possible, those organic impurities in the sewers, which are the causes of foul air.

Thoroughly to cleanse the sewers should be the great care of our municipal authorities, and there are few towns in the kingdom where this can be done with greater ease, or at less cost. An immense quantity of water, collected in the workings of old pits, is constantly running to waste; this, with the water from the drainage of the Town Moor, and the more efficient subsoil drainage of the town, if properly husbanded, would generally suffice to flush the sewers and render the drainage effective and healthy. And if it is deemed necessary occasionally to apply disinfectants, such as chloride of lime, it could thus be applied much more economically and efficiently than by being poured down the street gullies. In Paris, they have a system of Bornes-fontaines, which are somewhat like our stand-pipes, erected at intervals along the streets. From them the water is allowed to run freely along the channels for a certain time every morning, to wash all impurities away. By thus utilizing the water which runs to waste in the higher part of the borough, the Corporation would confer a great boon upon the town at a very small cost.

IX. SUBSOIL DRAINAGE.

Effective subsoil drainage is the basis of a good sanitary system, and where, as in Newcastle, the town is built almost entirely on a clay bottom, it is impossible to over-rate its importance. The want of it is felt in every sub-district of

the borough, but especially where there is neither sewerage nor paving. It has been seen that the absence of drainage is strongly expressed in a high death-rate from diarrhoea and consumption, and that the mere removal of subsoil water in towns by efficient drainage has had the effect of diminishing the prevalence of phthisis by 41 per cent. in those places. Nor can it be doubted that its influence will be seen in a diminished death-rate by other diseases.

Good drainage has reduced the prevalence of phthisis 41 per cent.

The test of effective drainage is the removal of all the damp from the walls and foundations of houses, and of all subsoil water from the streets. To many builders, daainage means merely to take the water off the surface, instead of from under the surface. The consequence is, when kitchens are sunk below the surface, the damp often rises to a great height by capillary attraction. This may indeed be prevented by a layer of asphalte when a few courses of bricks are set ; but the only safe and reliable remedy is the removal of the subsoil water. Until that is accomplished, not a stone should be put into the foundations, even although they are little more than a sod from the surface.

It is not enough to take the water off the surface. The subsoil water must be removed, so as to make the walls and foundations of houses perfectly dry.

Drainage by a closed pipe, the mode usually adopted, cannot be effective for the removal of the subsoil water. The pipe, being tightly connected with the main drain, as it ought to be, and the joints also being quite tight, to prevent any bad smell, it is impossible for the water to get away. Agricultural drains, which are effective in removing subsoil water, are constructed on another principle. They are not jointed, but are left open at the ends, and broken stone is put over them, to admit the free percolation of the water, and its entrance into the pipes.

Drainage by a closed pipe is not effective.

The practical problem is how to combine the advantages of both systems, how to secure the free percolation of surface and subsoil water, and yet to prevent the escape of sewer gases into the foundations of houses. This could probably be most easily and conveniently done by putting in good agricultural drains to run parallel with the line of houses and sewers, communicating with the houses merely by transverse rubble drains under the floors, and with the sewers, at points considerably removed from the houses, by traps, which should be accessible from the streets. The foul gases would thus be kept back, or absorbed in their passage by the dry earth about the drains.

The problem is how to secure free percolation of water and yet prevent the escape of sewer gases.

Where houses are already built, but the streets in which they are situated not paved, your sub-committee recommend that, before paving is commenced, two effective subsoil drains be constructed, one on either side of the sewer, and sufficiently near the houses, to a great extent to drain their foundations. This would not only contribute to the warmth, and comfort, and health of the inhabitants ; but would greatly improve the roadway itself. Indeed, the cost of such drains would be

The cost would be more than repaid by the additional solidity and durability of the roadway.

more than repaid by the additional solidity and durability of roadway: another proof that in sanitary matters what is best to be done is always cheapest in the end.

X. BUILDING REGULATIONS.

To secure complete ventilation width of space both in the front and back, is eminently necessary.

There is nothing more fully established in sanitary science, than the necessity for width of space, both in front of and behind houses, in order to secure complete ventilation. This is especially necessary where there are out-buildings with privies and ash-pits. Yet there are dwelling houses now in course of erection in the borough, (and not from any want of space), where these requirements are absolutely ignored, where there is no back street, and where the open space required by the bye-laws, is partly behind and partly at the side. If the last Town Improvement Act permits such violations of sanitary law, the sooner it is revised the better. No uniform rule, founded upon general principles, exists, to determine the amount of open space to each house. In this respect, it will be found that Newcastle unfavourably compares with some other towns where the death-rate is lower.

Table showing the amount of open space to each house, required in different towns.

The bye-laws of the Newcastle Corporation require less open space behind new-houses than those of other towns where building sites are not more available.

NAME OF TOWN.	HEIGHT OF HOUSE.	AREA OF OPEN SPACE REQUIRED.	DISTANCES.
Bradford, Morley ..	{ 1 Story	150 square feet	10 feet.
	{ 2 Stories	180 do.	12 feet.
	{ 3 Stories	225 do.	15 feet.
Bangor, Brighton.	{ 1 Story	150 do.	10 feet.
Barnsley, Derby.	{ 2 Stories	150 do.	15 feet.
Doncaster, Dover.	{ 3 Stories	150 do.	20 feet.
Grimsby, Leices-	{ Above	150 do.	25 feet.
ter, Plymouth,			
Warwick	{ 1 Story	150 do.	10 feet.
	{ 2 Stories	150 do.	12 feet.
Bolton	{ 3 Stories	150 do.	15 feet.
	{ 1 Story	80 do.	10 feet.
Bradford, near Man-	{ 2 Stories	80 do.	15 feet.
chester	{ 3 Stories	80 do.	25 feet.
Cardiff		{ Four parts unbuilt upon to five built upon.	
Coventry	{ 1 Story	Breadth of the building by	40 feet across
	{ 2 Stories	Do. do.	60 feet across
	{ Above		
Darlington	{ 2 or 3-roomed Houses	{ Two-thirds of the entire area of the ground floor	
	{ Larger Houses..	{ One-half of the entire area of the ground floor	
		{ One-third of the entire area of the ground on which the house shall stand.	
Sunderland			
Newcastle		{ One-fourth of the entire area on which the house shall stand.	

If owners of property in Sunderland do not complain of the building regulations, which require that one-third of the entire area of the ground on which the house stands,

should be left open behind; this should not be considered too large an open space for Newcastle. In the original draft of the bye-laws, one-third was the area required, and in the opinion of your sub-committee it is desirable to revert to the original arrangement with as little delay as possible. The whole of the building regulations of the Corporation, might, with advantage, be submitted to careful revision. New streets should be laid out so as to receive a maximum of sun light and air. They should be frequently intersected at right angles, so as to allow free circulation in the atmosphere. No *cul-de-sacs*, no closed street ends, no entrance archways should be allowed, nor any street promontories. No diminution of the open space from house-wall to house-wall permitted either at the centre or ends of streets. No streets should be allowed without back streets. The width of streets, both back and front, should be generally greater than it is. Sinuosities, and angles of old lanes should not be perpetuated in new streets. It should never be forgotten that the municipal arrangements of the present will affect the health of future generations. No opportunity, therefore, should be lost of widening streets, and of effecting improvements. A new Town Improvement Act should be obtained, founded upon an adequate knowledge of sanitary science, and of the wants of our rapidly increasing industrial population.

Not less than one-third of the area on which the house stands should be left open behind.

Streets should be constructed with a due regard to sanitary laws, and every opportunity should be embraced of making them as wide and straight as possible.

XI. OPEN SPACES AND PLAY GROUNDS.

As the omissions, as well as the errors, of the present will affect posterity for centuries, no time should be lost to secure the few open spaces which yet remain. Moreover, with such a tendency to congestion in the more central parts of the borough, in a few years these spaces will become so enormously valuable that indifference to this vital question will soon be irremediable. Pandon Dene, which has been a nursery of fever, should be laid out as a public pleasure ground for the east end of the town; and in Elswick a similar provision should be made for the dense and growing population of the west end. For every five hundred houses built there should be a public play-ground, which should be large, but need not be very costly. All that is required is to lay out a portion of each building estate in squares; to make the houses in these squares accessible to carts and carriages only on the outside, and to reserve the centre, which should be well drained, and covered with clean, dry gravel, for the merry games of children. Nor need there be any fear of injury to property. In the gardens of the Palais Royal, Paris, thousands of children disport themselves, from day to day, without a plant, or tree, or pane of glass suffering, although the square is surrounded on all sides by magnificent houses and shops. The opportunity of securing open spaces, both in Elswick and All Saints, is rapidly passing

The few remaining open spaces in the most densely populated parts of the town should be secured for parks and play-grounds.

Under their civilizing influence there would be less danger than now of injury to property.

away, and with it one method of diminishing our high infant mortality.

XII. IMPROVEMENT OF TOWN MOOR.

The Town Moor and Castle Leazes should be made more available by the completion of their sub-soil drainage, and by constructing a road all round, and good foot-paths across.

Various measures have from time to time been proposed for making the Town Moor and Castle Leazes more available for purposes of public recreation; but beyond a certain amount of drainage, and a carriage drive to Spital Tongues, comparatively little has been done. Your sub-committee suggest that, with due regard to the interests of the Freemen, a scheme, involving no large amount of expenditure, might be adopted, which would render these invaluable airing grounds more attractive and more useful to the great body of the people; and beg to recommend that the matter be remitted to the consideration of a special committee. A road all round the Moor, a few footpaths across it, and the completion of its subsoil drainage would in themselves be great improvements.

XIII. PUBLIC ABATTOIRS.

Public slaughter houses should be erected.

The slaughter houses at present in use in this borough, are many of them in close contiguity to human habitations. Out of 127 slaughter houses, there are only 52 above 20 feet from houses or dwellings; 33 are 10 feet and under 20, and no fewer than 42, are less than ten feet from inhabited dwellings. 16 are supplied with drains in the yard, 52 with blood holes; while 36 are absolutely without drainage, and only 23 are properly drained. Of 15 triperies, only five are above 20 feet from human dwellings, 2, 10 feet and under 20; while 8 are nearer than 10 feet. This is a state of things which demands instant attention and remedy. Your sub-committee would, therefore, suggest the propriety and importance of erecting suitable places for such purposes, at a sufficient distance from the dwellings of the people. They should be erected in an airy situation, and near a drainage outlet.*

XIV. NEW THOROUGHFARES.

Air and light must be let into the dense masses of dwellings where disease has revelled, by driving thoroughfares across them.

Your sub-committee further recommend the breaking up of those masses of crowded dwellings, some of which have been mentioned, by driving thoroughfares through and across them to let in light and air; the opening up of close and confined courts and chares; the general widening and straitening of the streets, and the removal of those irregularities and headlands that so much interfere with the renewal and purification of the atmosphere. The lower part of Pilgrim Street, Silver Street, Meeting House Lane, the Dog Bank, Stockbridge, Pandon, and the Wall Knoll, should all of them be swept away; and, after due deliberation, your sub-committee feel it their duty earnestly to recommend the opening of a great thoroughfare, not less than 70 feet wide, extending from the Central Station to the New Road, and continued so as to join

* Appendix XIX.

the proposed road to Walker. Commencing at the foot of Westgate Street, nearly opposite the Library of the Literary and Philosophical Society, skirting the north side of St. Nicholas' Buildings, and the south side of the Church, crossing Dean Street by an iron bridge, it would reach the lower part of Pilgrim Street, and thence in almost a straight line to the New Road, sweeping away the great centres of pestilence, pauperism, and crime already named. It would let the prevalent winds into the lower part of Pandon Dene, which is our valley of Hinnom; and to see how it would alter the topography of disease, we have only to look at the typhus map in the appendix. Nor would its advantages be fewer in a commercial than in a sanitary point of view. It would connect the Quayside with the Central Station at an easy gradient; open a direct line of communication between the east and west end of the borough; and in the increased value of its estate, at present comparatively unproductive, the Corporation would soon be recompensed for the expenditure; while, in the diminished death-rate of All Saints, there would be a return, the value of which your sub-committee will not attempt to estimate.

A proposed new street from the Central Station to the New Road would sweep away some of the worst fever-breeding localities in the town.

The cost would be repaid in commercial as well as sanitary advantages.

XV. NEW TOWN IMPROVEMENT BILL.

In view of the sanitary wants of the borough, your sub-committee cannot hesitate to recommend the application to Parliament for a new Town Improvement Act, prepared with a due regard to these wants. The errors and omissions of last Act are so numerous and important, that it is impossible, even now, for the Corporation to prevent flagrant breaches of sanitary law; and evils are being perpetuated, at which posterity will wonder, and of which, as it reaps the bitter fruits, it will have good cause bitterly to complain.

Application should be made without delay to Parliament for a new Town Improvement Act based on sound sanitary principles, and prepared with a due regard to the wants of the town.

Town Improvement, to be economical must be systematic; but system, to be enduring, must be based on sound principles and adequate knowledge. A new Act and a more comprehensive plan may be costlier at first, but will be cheaper in the end.

XVI. CONSUMPTION OF SMOKE.

Unconsumed smoke proves injurious to health by darkening and polluting the air, shutting out the rays of the sun, lowering the temperature, and, having forced a passage into the throat and lungs, by aggravating or exciting fatal pulmonary complaints. It has, indeed, been contended by some, that the gases given out by our chemical works, gas works, and other manufactories are disinfectant in their effect; but in vain we have examined the records of mortality for the past year to discover the slightest evidence of such an influence. On the contrary, there seems to have been no town in the whole kingdom, where foul-air miasms were more pre-

Smoke injures health by polluting the air, shutting out the rays of the sun, lowering temperature, and exciting pulmonary complaints. There is no evidence that it is disinfectant.

Much of the higher death-rate of Manchester, which is 6 per 1000 above London, due to its canopy of smoke.

The prevention of smoke is practicable and can be accomplished by a variety

The smoke nuisance should be abated.

A portion of the large estate of the Corporation, in the eastern part of the borough, where the overcrowding is greatest, should be let in perpetual feu to encourage the erection of suitable houses for the poor.

valent, and where they ran riot for a longer period without any adequate disinfection, than in Newcastle. If the discomfort and expense caused by the dense black smoke of manufactories can be borne with patience, it is not reasonable to expect that the public should bear with the same equanimity the air-poisoning which it produces. Notwithstanding the generally excellent sanitary arrangements of Manchester, its death-rate is 6 per 1000 more than London; much of it, doubtless, due to the fuliginous firmament by which that city is continually over-canopied. The very cheapness of our coal proves a source of danger to the public health; for it removes from spendthrift minds, which do not feel they owe any consideration to a distant posterity, nor very much to the present generation, the only motive which would lead them to economise its consumption. Though smoke is waste, and though the smoke nuisance has been shown to be curable, it still survives to pollute the air, and aggravate the death-rate. Twenty years ago, it was condemned by two select committees of the House of Commons, and by Commissioners appointed further to investigate the subject. We can only repeat what they affirmed, and what has been established by a vast amount of scientific evidence, that the prevention of smoke is practicable; that the mode of accomplishing this object is well understood; that, as the prevention of smoke implies a complete combustion of fuel, more heat is generated and a saving of fuel effected, when it is so consumed as to prevent any emission of smoke; and that, from experiments conducted under their investigation with a view to determine this point to their own satisfaction, they arrived at the conclusion that, although from careless management of fires there is often no saving, and that, indeed, there is frequently a loss of heat, still with careful management, the prevention of smoke is in many cases attended with, and might in most cases be made to produce, an economy of fuel; and that the cause of the emission of smoke in manufactories is either the bad construction of fireplaces, boilers, and flues, or the bad management of the parties entrusted with the flues. In view of these conclusions, your sub-committee do not hesitate to recommend, what no one can reasonably deem a hardship, that, for the prevention of the smoke nuisance, the provisions of the Sanitary Act of last session should be put in force without unnecessary delay.

XVII. CORPORATION BUILDING SITES IN FEU.

The Corporation possesses a large estate in the eastern part of the borough, where much of the overcrowding exists, and your sub-committee would recommend that a portion of the estate be laid out in building sites for the labouring classes, and let in perpetual feu. The construction of the proposed road to Walker, and of a street railway in connection there-

with, would, by rendering it more accessible, greatly enhance its value; and the adoption of a system of perpetual ground-rent, while encouraging working people to become their own landlords and stimulating builders, would, in time, increase the permanent revenue of the borough.

XVIII. CORPORATION BUILDING LEASES.

Your sub-committee have ascertained that some of the clauses inserted in leases granted by the Corporation, although admirable in their intention, have the effect of preventing Building Societies from advancing money upon Corporation leaseholds, and thus of deterring working-men from building; and it seems worthy of consideration whether the clauses could not be so altered as to facilitate the borrowing of money upon such leaseholds, without relaxing the restrictions upon the conversion of dwelling-houses into places for the sale of liquor.

The building leases should be altered.

XIX. MODEL LODGING HOUSES.

The erection of model lodging houses in different parts of the town, would tend greatly to remedy the over-crowding in tenements. Experience has proved the fact that lodging-houses can be erected, with a due regard to sanitary and moral considerations, to pay a large per centage upon the outlay. According to the report of the Society of Arts, it appears that the Society for Improving the Dwellings of the Labouring Classes established two sets of model lodging-houses in London; one in 1847, in Charles Street, Drury Lane, containing 82 beds; and one in 1849, in Hatton Garden, containing 54 compartments. According to the return of 1863, the former paid a profit of $12\frac{1}{2}$, the latter $8\frac{1}{2}$ per cent. upon the outlay. The "Leeds Model Lodging-House and Mechanics' Home" pays an amount of interest upon the invested capital equal to, and frequently exceeding, that of the majority of railways. In Glasgow there is a model lodging-house, giving very superior accommodation, and paying a dividend of ten per cent. The local authorities of Huddersfield availed themselves of the Lodging-House Act of 1851, and in 1854 opened a model lodging-house in premises previously used as a warehouse. The cost of the building was upwards of £5,000, and is capable of accommodating 146 persons nightly. It is expected that at the end of thirty years the first outlay, with the interest on the loan, will be repaid, and the building become the freehold property of the town. Although private speculation has done more and better in providing model lodging-houses than corporate action, it cannot be doubted, that with caution and economy, the Corporation may realize seven per cent. upon any money which it may invest in model lodging-houses. The principal conditions of success are: (1) that provision be made for not fewer than 50, and not more than 100 nightly lodgers in each

Model lodging houses should be erected by the Corporation in different parts of the town.

In London such houses pay $12\frac{1}{2}$ and $8\frac{1}{2}$ per cent. upon the outlay; and in Glasgow 10 per cent.

Those of Leeds and Huddersfield have also been successful.

Private speculation has realized even a larger per centage.

Model lodging houses should be of moderate size, conveniently situated, and plain, but roomy.

building; (2) that the model lodging-houses be situated in suitable districts; (3) that the building be plain, but roomy and convenient.

XX. IMPROVED DWELLINGS FOR THE PEOPLE.

The Corporation should provide decent dwellings, at least for those who have been displaced by public improvements.

Until there is more house accommodation all efforts to check overcrowding will be fruitless.

The Corporation of the City of London has voted £120,000 towards the erection of improved dwelling for the labouring classes.

Two blocks accommodating 168 persons in separate tenements with every convenience, have already been built, and are always let.

They return a fair amount of interest upon capital expended.

And in Newcastle where land is so much cheaper, there can be no difficulty in making them remunerative.

It appears to your sub-committee that it is the duty of the Corporation to set the example of providing decent dwellings for the labouring classes. The Corporation may at least fairly be held responsible to provide suitable homes for the 700 or 800 persons who have recently been displaced by public improvements. Supply has not met the demand, nor if we may judge from the past, is it likely to do so.

All efforts to check overcrowding will be vain, unless further and larger provision be made for the accommodation of the working classes. Both by Corporate bodies, Limited Liability Companies, and the Trustees of Mr. Peabody's princely gift to the poor, efforts have been made in other parts of the country, but especially in London, to solve the great problem of the day. The Corporation of the City of London has voted £120,000 towards the erection of improved dwellings for the labouring classes. Already two large blocks have been erected in Farringdon Road, Clerkenwell, capable of accommodating 168 families, each in a distinct and separate tenement. On the ground floor there are twelve large shops, with good basements. Each tenement has a wash-house with water supply, sink, water closet, coal place, copper, and dust shoot. There is a fireplace in every room of the building; and the living rooms have ranges, oven and boiler, cupboards, dressers, and other conveniences. The rules for the tenantry are simple and excellent: thus, the fifth rule directs that "No tenant will be permitted to under-let any of the rooms in his occupation unless he shall first obtain the permission of the committee." All the tenements are invariably let. The amount of the contract for the erection was £37,043, extras and additions, £1516 2s 10d, making a total cost of £38,559 2s 10d. The tenements are let by an agent of the Improvement Committee of the Corporation, and preference is given to the artizan class. The rent charges are fixed, but their amount varies, according to position, from 6s to 7s 6d per week for three rooms and separate wash-house, and from 4s 6d to 6s for two rooms and separate wash-house. There is a great demand for tenements, none ever being unlet; and scores of applicants always waiting for the first vacancy. The returns are satisfactory, and show that 4 to 5 per cent. will be realized on the outlay. If, where land is so high, and building so costly, as in the City of London, tenements, with suitable conveniences, can be provided for artizans, at an average rental from 2s to 2s 6d per room, it cannot be deemed impracticable to erect such buildings in Newcastle to be remunerative, even at a considerably lower rental.

The result to health, so far as it has yet been traced, is most satisfactory, and is shown in the fact that the London Society for Improving the Dwellings of the Labouring Classes lodges nearly 1700 persons, some of them at a weekly rental of 1s. 6d.; the average death-rate for the last four years being a fraction above 17 per 1000, while that of the neighbourhood is 27 per 1000.

The experience of the Metropolitan Association for Improving the Dwellings of the Industrious Classes is equally satisfactory. During the visitation of cholera in 1849, although three of their Establishments are situated in localities where the mortality was very great, there was not a single death in the whole of the houses, and few cases of diarrhoea. In the visitation of 1854 there was but one case of cholera, and that could not be said to have originated in the building, as the man—who was a nightly lodger in the Charles Street house—had suffered from long neglect and great destitution. The late Dr. Southwood Smith remarks that “if the whole of the metropolis had been as healthy as the Metropolitan Buildings, Old Pancras Road, on an average of three years, there would have been an annual saving of about 23,000 lives!” a calculation which bears out the startling assertion made by Mr. Simon, the able medical officer of the City of London, that “of the 52,000 deaths which occur annually in the metropolis of Great Britain, one-half might have been averted by the use of means at our disposal, whilst the untold amount of acute suffering and lingering disease caused by neglect is beyond calculation.”*

Sir Charles Hastings bears equally important testimony to the value of similar efforts in Worcester. “More than ten years ago,” he says “an association was formed to build model lodgings in one of the lowest and most degraded parts of the city, where there was a squalid population and a death-rate of not less than 23 or 24 in a thousand. The old houses were cleared away, and in their place a rather handsome pile of buildings was erected, and the internal arrangements of some of the London model lodgings were copied. It is gratifying at the end of ten years to be enabled to say that great success, in one point of view, has attended the experiment. A most decent set of inhabitants, belonging to the working classes, tenant the houses, and form an agreeable contrast to the former inhabitants. The sanitary result is highly encouraging. During the last five years in a population of about 140 men, women, and children of the artizan class, occupying thirty-four houses, there have not been more than eight deaths; thus reducing the rate to 16 in 1,000. It is also worthy of note that whilst Worcester from the month of November, 1863, to the month of May, 1864, was visited by

The average death-rate in the buildings erected by the London society, occupied by 1700 persons, for the past four years is a fraction above 17 per 1000.

In the dwellings of the Metropolitan Association the same result has been attained, and when cholera was epidemic, the people in these dwellings were spared, though it raged all around.

Had the same death-rate prevailed throughout London, there would have been an annual saving of 23,000 lives.

In Worcester the sweeping away of the wretched property in the lowest part of the city, resulted in reducing the death-rate from 23 in 1000 to 16.

And during severe and fatal epidemic of scarlatina, only one death occurred in the model dwellings.

* The Physical Condition of the Labouring Classes resulting from the state of their Dwellings, by Henry Roberts, F.S.A.

a severe epidemic of scarlatina attended by a high rate of mortality, only one death from this cause occurred in the model lodgings."

The moral improvement has been even more gratifying, such healthful and peaceful abodes acting as silent monitors upon the neighbourhood.

But not only has the improvement in the physical condition of the occupants of these houses answered the most sanguine expectations of their founders, but it is still more gratifying to know that *moral* improvement has been made. The intemperate have become sober, and the disorderly well conducted, since their residence in these healthful and peaceful abodes. No charge of crime, nor complaint of disturbance, has been lodged at any police station against a resident in these dwellings. The neighbourhood in which many of these houses are situated has also participated in their ameliorating influence. They appear to act as silent monitors, reproving disorder and encouraging cleanliness and propriety. The Superintendent of one of the Establishments says, "The nocturnal uproars in the adjoining streets, which constantly disturbed the inmates when first the houses were opened, gradually diminished, and finally ceased altogether."

XXI. ENCOURAGEMENT TO PROCEED.

In 30 years the death-rate of London has been reduced from 50 to 24 per 1000.

Experience warrants the belief that the vigorous prosecution of sanitary reforms would greatly reduce the excessive mortality of this borough. In thirty years the death-rate of London has been reduced from 50 to 24 in the 1,000; Gloucester, from 27.60 to 19.71 per 1,000; Berwick, from 28.5 to 21.7; Cheltenham, from 22 to 16; Worthing, from 25 to 15½; and Lancaster, from 28 to 22. If such is the result of partial sanitary improvements, what might be expected from a more perfect application of the laws of health? In Macclesfield, after five years of improvement in house and street regulations, and the construction of improved dwellings for the poor, the decrease of mortality ranged from 12 to 60 per cent. As to sickness, the cases attended by the union surgeons were from 24 to 29 per cent. less; and police offences were reduced 24 to 55 per cent. Before the operations of the Public Health Committee the mortality in Macclesfield, in a period of five years was at the rate of 33 in 1,000; for the five years after its operations it was 26 in 1,000. The average age of all who died in the first period of five years, was 24 years; at the last five years, it was 27 years. The last years average is 28½ years. Three years, at least, have already been added to the life of each individual. Deaths of children under one year have decreased 16.3 per cent., and those under five years 4.6 per cent. The decrease of deaths is chiefly in that class of diseases which are preventible. Zymotic diseases have decreased upwards of 2.7 per cent. The results, says the committee that reports them, were singularly confined to localities operated upon. Illustrations of a similar character might be multi-

In Macclesfield after five years of improvement, the decrease of mortality in certain districts ranged from 12 to 60 per cent.; and three years were added to each life.

plied indefinitely. The effects upon the country as a whole are seen in the fact, that since 1840 an annual mortality in English towns of 44 in 1,000 has been reduced to 24·25 ; an annual mortality of 30 has been reduced to 20, and even as low as 15 ; and human life has now more value in England than in any other country in the world—a result entirely due to better sanitary arrangements. Upon a review of the the whole case, there can be no doubt that, under wise and vigorous sanitary improvement, Newcastle may become one of the healthiest of the large towns in the kingdom ; and that here, at least 1,200 lives may be saved every year to their families and their country. The chief responsibility for this great result rests with the Corporation, but there is no citizen who cannot aid in the work—a work, one of the noblest and most patriotic in which the human mind can engage.

Since 1840 an annual mortality in English towns of 44 in 1,000 has been reduced to 24·25.

Under better sanitary arrangements 1,200 lives may be saved every year in Newcastle, and it may become one of the healthiest towns in the kingdom.

The Red Dots indicate the Localities of the Deaths from Scarlatina in 1866. The Green Dots indicate the Localities of the Deaths from Typhus and Typhoid Fever during 1863-4-5-6.

Borough of Newcastle-upon-Tyne.

TOPOGRAPHICAL CHART

OF THE
DEATHS FROM SCARLATINA IN 1866;
AND OF THE
DEATHS FROM TYPHUS & TYPHOID FEVER
DURING THE YEARS 1863-4-5-6.

Contents of the Borough of Newcastle-upon-Tyne.

A	ELWICK TOWNSHIP	306	2	28
B	AND KING'S MEADOWS	84	0	27
C	WESTGATE TOWNSHIP	348	0	5
D	St. JOHN'S PARISH	82	1	25
E	St. ANDREW'S PARISH	1400	1	29
F	JERMOND TOWNSHIP	361	0	4
G	St. NICHOLAS' PARISH	44	1	29
H	ALL SAINTS' PARISH	302	2	29
I	STILES TOWNSHIP	471	2	28
J	BEATON TOWNSHIP	307	0	21
	TOTAL	3280	7	31

The whole of the Chaplaincy is also in the Parish of Saint John.

JOHN CHRISTIE, CARTON HOUSE, NEWCASTLE-UPON-TYNE.

BOROUGH OF NEWCASTLE-ON-TYNE.

Table, showing the deaths from Typhus in each of the years 1863, 1864, 1865, and 1866.

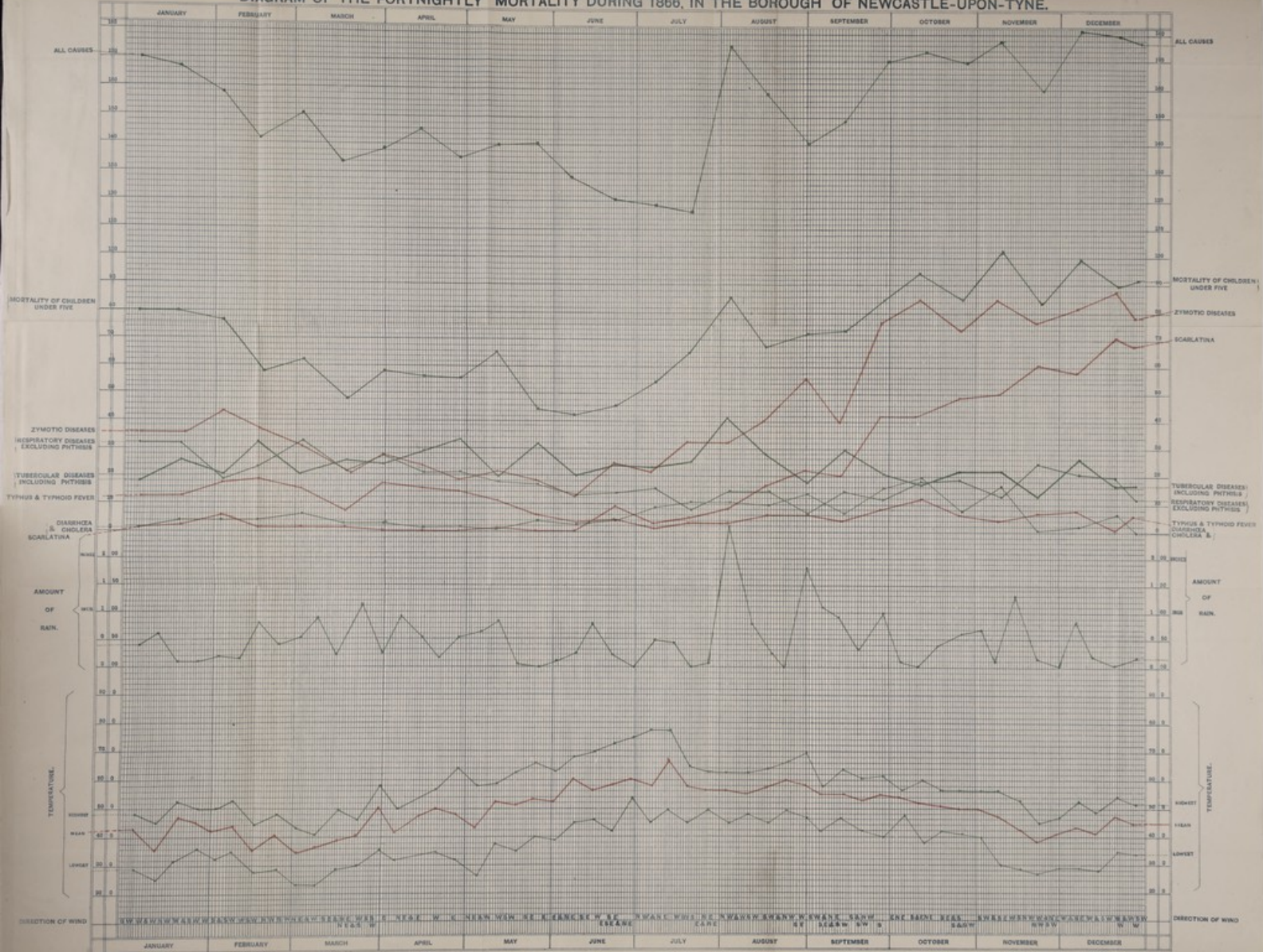
Registration Sea-Districts.	1863	1864	1865	1866	TOTAL
All Saints	22	19	68	116	225
St. Nicholas & St. John	9	18	35	18	71
Fever Hospital	4	6	20	6	36
Byker	12	7	40	26	85
St. Andrew	10	15	18	14	57
Wangate & Elswick	34	27	31	34	126
Newcastle-on-Tyne	91	102	208	224	625

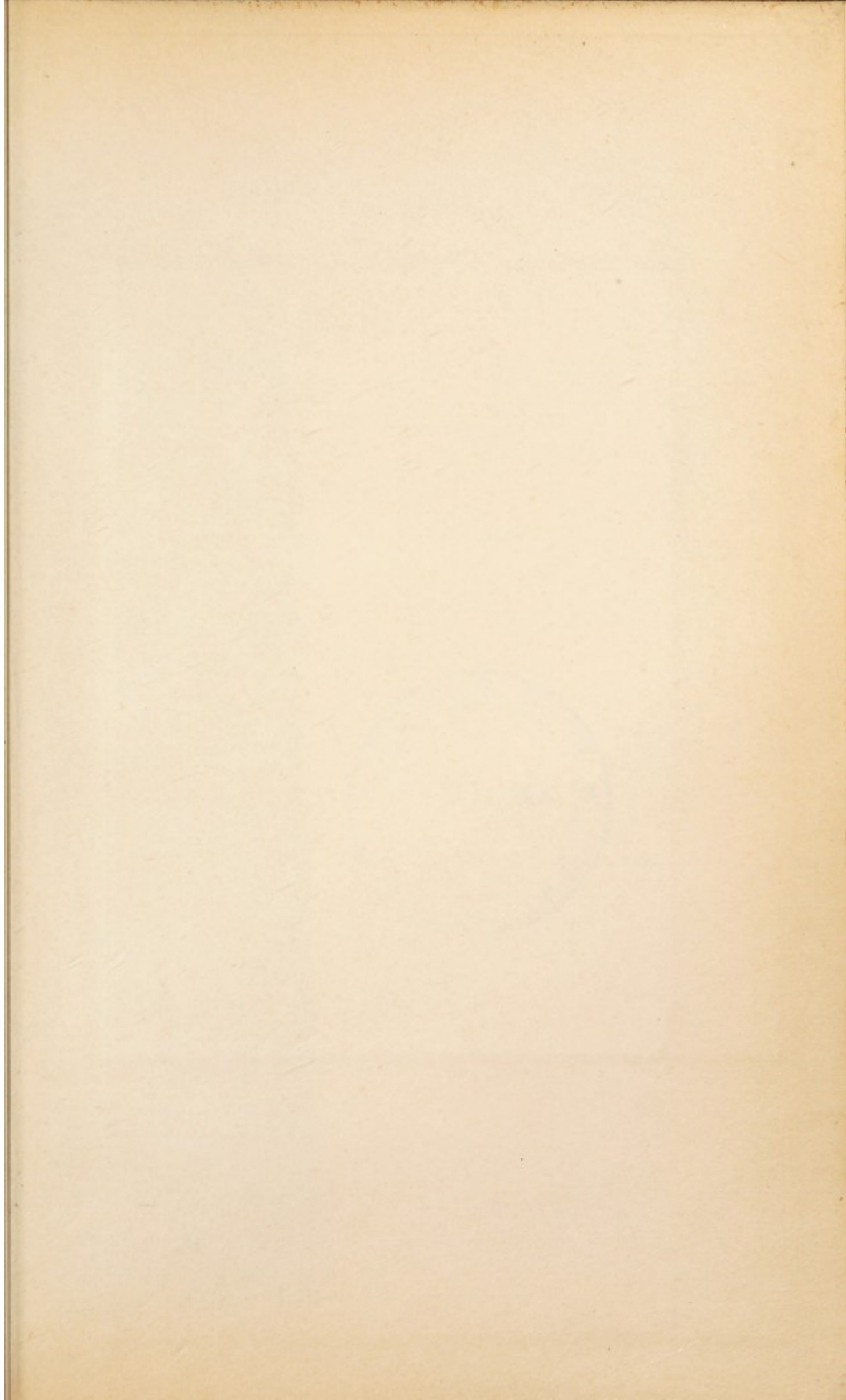
BOROUGH OF NEWCASTLE-ON-TYNE.

Deaths from Scarlatina, shown on the map by red dots, in 1866.

	1866	TOTAL
All Saints	5	1
St. Andrew	1	1
Byker	2	9
Wangate & Elswick	5	6
St. Nicholas & St. John	5	7
Borough	11	10

DIAGRAM OF THE FORTNIGHTLY MORTALITY DURING 1866, IN THE BOROUGH OF NEWCASTLE-UPON-TYNE.







Ac 4478

