

REPRINTS AND REFLECTIONS

EXTRACTS from Appendix (A) to the Report of the General Board of Health on the Epidemic Cholera of 1848 & 1849^a

Report by Dr Sutherland

Section 1

Localizing causes of cholera

Before proceeding to describe the various measures of a medical preventive nature carried out under the regulations of the General Board of Health, it is necessary that I should enter shortly into the reasons for their adoption, by describing those special conditions attending the epidemic seizure which they were intended to meet. Sufficient evidence will presently be advanced to show that cholera is by no means so capricious in its attacks as has been generally supposed, but that on the contrary it is propagated according to certain fixed laws, although the limits of these have not as yet been precisely defined. Whether or not there be sufficient proof that the epidemic influence progresses from point to point, and that it is not always universally diffused over the whole face of a country—whether or not there be also evidence to show that the intensity of that influence is not necessarily equal throughout the area within which it operates—and whether or not human means have any control over these properties of the epidemic; it is nevertheless of extreme importance to know that there are other laws, the modifying conditions of which can be to a great extent influenced. By far the most important of these laws is that which will frequently be referred to under the term *localization*, or, in other words, that property which is possessed by certain states of the constitution, or by certain well-marked characteristics of special localities, by virtue of which the epidemic obtains such power over the resisting vital forces of individuals, as to produce that class of phenomena usually ranked under the general designation of cholera.

During the late epidemic the following were among the more frequent indications of the prevalence of an epidemic constitution:

General malaise.

Uneasiness of stomach or bowels.

Slight dyspepsia.

Flatulence.

Derangements of the nervous and vascular systems, such as transient sensations of giddiness, or fullness in the head, or partial coldness of the surface, etc.; occasionally a slight degree of timidity; sometimes a tendency to sore throat, or symptoms approaching those of influenza.

An open state of the bowels, proceeding to relaxation or painless diarrhoea.

Such symptoms have very frequently prevailed over considerable epidemic areas, without leading to any more serious disease. It has happened, however, that in certain constitutions, predisposed by irregular and dissipated habits, these slight premonitions have been followed by rapid and fatal attacks of cholera. It appeared as if the weakened vital stamina, after resisting to a certain point, suddenly gave way, while the natural powers of other individuals, which had not been put to so severe a test, were sufficient to preserve life.

Under similar circumstances specific acts of intemperance in food or drink, over-fatigue, or perhaps sudden alarm, have destroyed the resisting power. I have likewise known a number of instances in which individuals, living in comparatively healthy situations, have been suddenly destroyed by the use of purgative medicine, and that in very moderate quantity. Saline purgatives, which under ordinary circumstances may be used with advantage, are invested with poisonous properties in relation to the altered constitutional state produced by the epidemic influence. A similar fact has been observed in regard to almost every form of aperient. A case came under my own knowledge, in which an ordinary dose of rhubarb and magnesia with mint-water produced a rapid and fatal attack of cholera in a healthy young woman who had taken the medicine as an aperient.

Improper articles of food have not unfrequently produced a like result; a remarkable illustration of which will be found in the case of the Prussian sailors on board the barque 'Pallas'.

The influence of such causes in producing attacks of cholera has not been uniformly great. In some epidemic attacks imprudences have been committed with impunity, which in others have been attended with fatal results, while under neither of the circumstances alluded to did the disease distinctly localize itself. It appears reasonable, therefore, to conclude, that it is possible for the population of one locality to become more predisposed than that of another similarly circumstanced, simply from the greater intensity of the epidemic influence.

It is of great importance to keep in mind this distinction, because, in issuing instructions for the guidance of the population, as to diet, regimen, etc., it would be manifestly insufficient to take the previous experience of any one locality as a foundation on which to rest those precautionary measures to be recommended for every other. I have met with instances in

^a Published by HMSO, London, 1850.

which eminent members of the medical profession objected to certain of the recommendations of the General Board of Health, in regard to the points under discussion, from their not being entirely borne out by their own experience. It would certainly be more satisfactory were it practicable to advise those measures which would be precisely adapted to every given condition, but, as such is not the case, general recommendations founded on the broadest basis of experience must obviously be the best.

It is possible to conceive that an epidemic constitution might be so intense as to destroy every human being exposed to its influence, although living under the best possible sanitary conditions, just as if the atmosphere were to become suddenly converted into carbonic acid gas. Such, however, does not appear to be the function of epidemics. They are *corrective* rather than *destructive*, and one of their special objects seems that of arousing mankind, by signs which cannot be mistaken, to a sense of the necessity of recognising and obeying the laws of his physical existence. They have an indirect bearing also on his moral state, by exciting to action the dormant powers of observation, intelligence, and sympathy; while on the other hand, those very sanitary evils which tend to propagate epidemics have a direct influence in degrading the human race, and in leading to ignorance, vice, and crime.

Under such circumstances men are most readily affected by the passion of fear, and the instinct of self-preservation leads them to inquiries and physical reforms which remove those material causes from which originated a debased state of health both of body and mind.

Epidemics invariably haunt the same localities. A few scattered drops of the storm may fall elsewhere, but its violence is spent where its purifying influence is most required. I shall presently describe and illustrate those conditions which cholera finds most congenial. It is under these that a new class of phenomena is developed. We find certain appearances among the people, which, when once observed, can hardly be forgotten. The countenance has a peculiar aspect, half anxious, half apathetic. The eyes are suffused, and often surrounded by a faint areola. The skin has a dusky reddish hue, as if from impeded circulation. I have found such persons averse to exertion, and indisposed to take any steps for their safety. They have usually denied being ill, and refused to leave the locality; and I have not unfrequently been able to predict the deaths of individuals from their positively objecting to being interfered with. Existing cases of fever, or other epidemics, change their aspect and fall rapidly into hopeless collapse. A very fatal disease suddenly breaks out, marked by the following symptoms:

- Diarrhoea.
- Purging of serous matter.
- Vomiting.
- Cramps.
- Coldness.
- A peculiar aspect of countenance and expression of voice.

- Pain in the stomach and bowels.
- Intense thirst.
- Suppressed urine.
- Difficult respiration.
- Collapse.
- A brownish purple aspect of the skin, with occasional eruption.
- Blueness.
- Pulselessness.
- Shrivelling up of the body, and wrinkling of the skin of the hands, just as if they had been soaked in water.
- A certain listlessness of mind, from which, however, the patient can be roused into clearness of intellect, the body appearing almost dead before life is extinct.
- Death.

The development of these diseased states has occupied very different periods of time in different localities and constitutions. Sometimes their course has extended over a period of several days, and at others death has ensued within two or three hours of the moment of seizure. A state of hopeless collapse has sometimes been produced in a few minutes, by the passing of a single large watery evacuation, in persons who had risen from bed apparently in their usual health. Instances have also occurred of persons dropping down in the street and dying shortly after.

It has been generally observed that the larger proportion of attacks have taken place through the night, a point in the history of the epidemic which is well illustrated by the following table supplied to me by Dr. Alex M. Adams, Glasgow (see Table 1).

It will be perceived that between the hours of 8 p.m. and 8 a.m. the cases amounted to 140, and the deaths to 65, against 85 cases and 53 deaths occurring during the corresponding twelve hours of the day.

The most important practical point which it behoves us to know is, that the severe manifestation of the presence of cholera described above does not take place over the whole district covered by the epidemic influence. Were this the case, a large proportion of the people in affected countries must necessarily perish. All experience has, however, proved that a certain portion escape, while another portion are destroyed, and the fatal outbreaks of the disease are invariably connected with one or more of the following local defects:

- Overcrowding.
- Dampness.
- Filth.
- Want of ventilation and atmospheric pollution.
- Proximity to graveyards and other nuisances, pigsties, offensive sewers, etc.
- Narrow, closely-built, and confined neighbourhoods, bad water, natural defects of situation. The impregnation of the subsoil of towns with organic matters from filthy streets, cesspools, and other nuisances. Imperfect sanitary works, and other similar causes.

Table 1

Period of Attack	8 a.m. till 12 Noon	12 Noon till 4 p.m.	4 p.m. till 8 p.m.	8 p.m. till Midnight	Midnight till 4 a.m.	4 a.m. till 8 a.m.	Totals
Cases	35	18	32	33	56	51	225
Deaths	26	8	19	18	20	27	118

It will be observed that the diseased conditions likely to arise from the influence of such causes are those connected with atmospheric impurity, a deranged state of the digestive functions, and depression of the vital powers. In all localities where they exist there is a great preponderance of disease and mortality; but I am inclined to consider the epidemic susceptibility, properly so called, as distinct from the ordinary diseased states. It is not always the most sickly who suffer from epidemics; on the contrary, a large number of victims from fever and cholera are taken from amongst persons in the prime of life; and it has been often remarked, that the wards of cholera hospitals have shown a considerable proportion of robust men and women amongst their occupants.

The following table of the ages of 2322 cholera cases, and 1058 deaths from cholera, occurring in Glasgow, will prove how heavily the epidemic fell on the productive periods of life (see Table 2).

It thus appears that, out of 2322 cases, not fewer than 1148, or nearly 50 per cent, occurred between the ages of 20 and 40; and that, out of 1058 deaths, 503, being a similar percentage, occurred between the same ages: circumstances which show how important it is in a social point of view that every resource of science should be put in requisition to extirpate the haunts of epidemics. Another proof of the peculiar nature of epidemic susceptibility is afforded by the fact that there have been numerous examples of persons going from healthy districts into localities affected by cholera, and after remaining there a day or two, but without necessarily coming in contact with any diseased individual, dying of the epidemic after their return home, their mere presence in such places for a certain time being sufficient to produce death. To this class of cases belong a number of the presumed instances of contagion. We have thus two classes of attacks—the first taking place in persons habitually living in unhealthy situations, and in whom the addition of the epidemic influence to pre-existing susceptibility had produced a fatal result; while in the second class, the simple fact of an individual being suddenly exposed to the influence of an affected locality, and without having been apparently exposed to predisposing causes, has led to similar consequences.

All the facts which I have observed have appeared to point to a solution of the following kind: namely, that under the unhealthy conditions above mentioned the epidemic has the power of intensifying itself, or, in other words, multiplying its force of attack, until at last it produces results closely approximating to those of aerial poisons. It appears as if some peculiar organic matter, which constitutes the essence of the epidemic, when brought in contact with other organic matter proceeding from living bodies, or from decomposition, has the power of so changing the condition of the latter as to impress it with poisonous qualities of a peculiar kind similar to its own.

If we could suppose that certain organic impurities, existing in the atmosphere of unhealthy neighbourhoods, passed into the blood through the lungs, so as to follow the circulation, and that similar impurities taken into the stomach with articles of food or drink were likewise absorbed into the blood; if we could moreover suppose that the epidemic influence possessed the

power of assimilating such organic matter to its own poisonous nature, we should be enabled to include a number of complex phenomena under a hypothesis which would indicate the requisite measure of prevention.

.../

Illustrations of localising causes of cholera

.../

Unwholesome Water



A drop of Thames water, as depicted by Punch in 1850

I have frequently had occasion to refer to the very injurious effects resulting from the use of impure water during the late epidemic. In nearly every city or town affected this element has been more or less prominent, and a number of most severe and fatal outbursts of cholera were referable to no other cause except the state of the water-supply. Such has especially been the case when the water was obtained from wells into which the contents of sewers or privies, or the drainage of graveyards, had escaped. The predisposition occasioned by the continued use of such water is perhaps the most fatal of all; and the proportion of deaths to attacks has generally been much greater in epidemic seizures resulting from it than from any other predisposing cause.

The water has at times been most offensive to the smell; but occasionally the only apparent impurity has been a little muddiness. I have known water pronounced to be, chemically, wholesome, occasion the death of a large number of persons, although I never met with an instance in which the microscope did not detect the presence of a considerable amount of organic matter.

I select the following illustration out of a number, because it is accompanied with statistical data (see Table 3).

Table 2

Ages	Under 10 Years	10 to 20	20 to 30	30 to 40	40 to 50	50 to 60	60 to 70	70 to 80
Cholera cases	192	315	616	532	415	138	93	21
Deaths	91	113	269	234	195	77	65	14

Table 3 Table of Houses in Hope-street, Salford, showing the effect of impure water in predisposing to attacks of cholera

No. of House	Source of Supply	Diarrhoea Cases	Cholera Cases	Deaths from Cholera
(East side of Street)				
2 to 13				
14	Pump-water	–	1	1
16				
18	Pump-water	–	1	1
20 to 32				
34	Pump-water	–	2	2
36 to 38				
Cellar	Pump-water	–	2	1
40 to 42				
Derbyshire-court		1	–	–
3, Swann's-court				
4	Pump-water—occasionally	1	–	–
5				
6	Pump-water	–	1	1
8 to 10				
11	Pump-water	2	–	–
13		4	–	–
16				
(West side of Street)				
3				
5	Pump-water	1	–	–
7		3	–	–
9 to 13				
15	Pump-water	2	–	–
17		3	–	–
19	Pump-water	1	3	3
21				
23	Pump-water	–	1	1
25	Ditto	1	1	1
27	Ditto	2	–	–
29				
31	Pump-water	1	–	–
33	Ditto	–	1	1
35	Ditto	1	–	–
37	Ditto	–	3	3
39	Ditto	4	–	–
41	Ditto	–	1	1
43	Ditto	1	–	–
45	Ditto occasionally	2	–	–
47	Pump-water	–	1	1
49 to 55				
Muslin-street to Christ Church-street				
4	Pump-water	–	–	–
Heap's-court	Ditto	–	4	4
Pump-court	Ditto	–	3	3
Cow-lane	Ditto	–	1	1
Several houses were shut up.				

GENERAL RESULTS

	Total Diarrhoea Cases	Total Cholera Cases	Total Deaths
Number of houses using water from the pump: 30	19	26	25
Number of houses using other water: 60	11	None	None

While cholera was prevailing in Manchester, a sudden and violent outbreak of the disease took place in Hope-Street, Salford, apparently connected with the use of water from a particular pump-well. As some difference of opinion had arisen on the subject, I procured samples of the water, which were slightly muddy in appearance, and, when examined under the microscope, gave the usual indications of the presence of organic matter. I then obtained the statistics of the streets where the water was used from Mr. Currie, one of the acting medical officers of the union. The houses were found to be supplied from a variety of wells, and also from the pipe-supply. Table 3 gives the result of the inquiry, and the number of epidemic cases. Wherever the source of the water-supply is not stated, it may be considered as good; and where it is designated as 'pump water,' the people had used the water complained of.

The following are specimens of the complaints made against the water by the people in the neighbourhood:

'The water looks rather muddy, and has not been clean since the pump was mended.'

'Dreadful heavy dirty water-settlings from a canfull.'

'Has seen the sludge boil like barm at top, and it left something on the pan like soapsuds. The week we began to use the pump-water the man died.'

John Holding states that he was stopped from using a pure well-water, and was obliged to use the pump-water. On Saturday, Sept. 29, he 'Got two cans of water from Pump-court.' A lodger was seized with cholera on Monday, and died next day.' Another complainant states:

'That he was afraid of using the pump-water, on account of the water in which the bedding of two persons who had died of cholera had been washed having been thrown into the gutter, and he thought it ran into the well.'

It appears that the well had been repaired, and, from some cause or other, a sewer which passes within 9 inches of the edge of it had become obstructed and leaked into the well.

The statistical evidence given in the preceding page affords a melancholy and convincing proof of the enormous destruction of human life which may ensue from a very slight degree of negligence or accident.

.../

7 Defective Sanitary Alterations, etc.

The first outburst of cholera in the city of Bristol took place in three courts in Red Cross-Street, known by the names of Wellington-Court, Wellington-Buildings, and Gloucester-Court, which cover a piece of land 56 yards in length by 37 in breadth (see Figure 1). This measurement includes the houses in Red Cross-street, so that the actual area covered by the courts is about 1850 square yards. On this oblong piece of land are 6 rows of houses built back to back, making in all 66 dwellings. An overcrowded graveyard extends along two sides of the ground, and on the other two sides it is shut in by buildings, and two out of the three courts are entered from Red Cross-Street by narrow

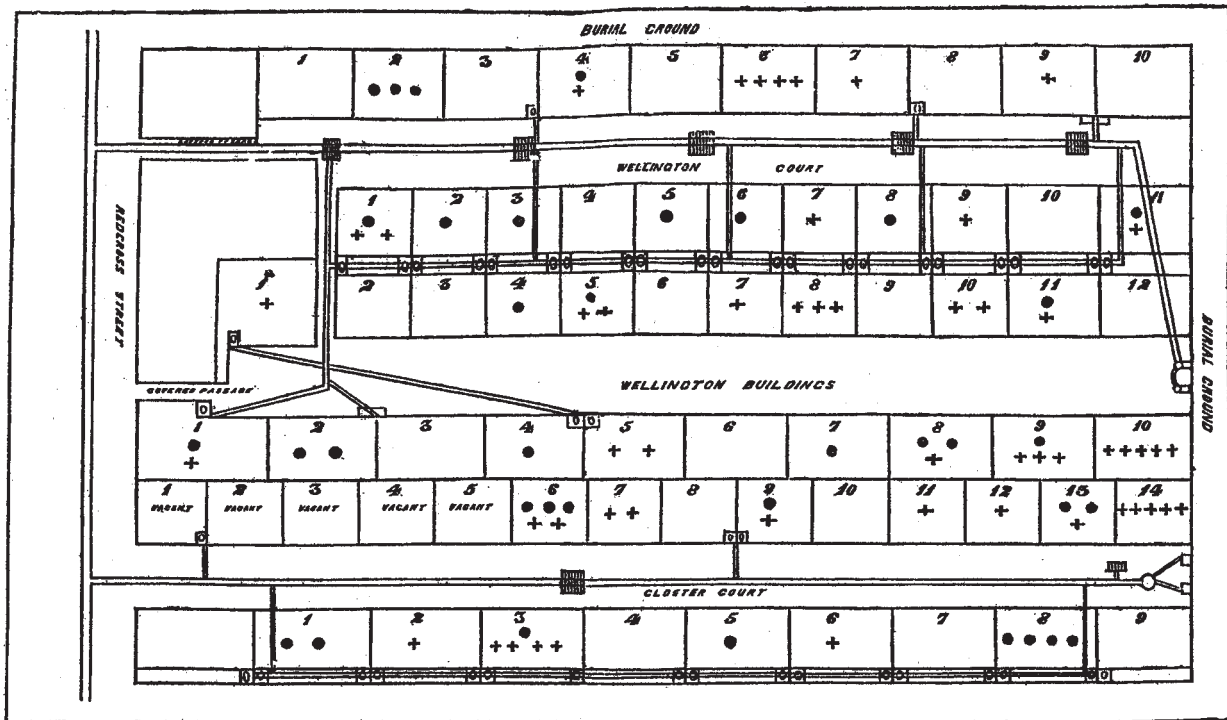
covered passages about 10 yards in length, the third court being open. Were there no other unfavourable circumstances than the position which these courts occupy, it would be sufficient to account for their unhealthiness, the only ventilation they receive being from the adjacent burial-ground, the drainage from which no doubt also exercises a most injurious influence on the neighbourhood. The houses are very small, and when the disease broke out they were crowded with people. The supply of water was deficient and impure, and was derived for all the three courts from one pump in Wellington-Court, into which there had been an escape of drainage, either from the sewer of the court, which passed close to it, or from the burial-ground. A sewer runs through Red Cross-Street, which is connected with two drains in Wellington-Court and Gloucester-Court; but there being no fall to carry off the drainage, the court drains were constantly full of the refuse of the privies. These drains are in fact the cesspools of all the houses, and they communicate directly with the surface of the courts by a large number of ill-trapped gully-grates, the effluvia from which are at times most horrible. The people were obliged to cover the gratings with canvas pressed down by a weight.

The position and construction of the privies require also to be noticed. On one side of Wellington-Court there are two in the houses, and one in the court itself. On the opposite side there are 11 houses, corresponding to the same number in the next court, called Wellington-Buildings. Between these two rows of houses there is a narrow space, which contains the privies belonging to both. The privies in Wellington-Buildings are placed some of them behind the houses, some within the houses, and some in the courts. In Gloucester-Court there are two privies in the court, and three in the houses on the left-hand side. Behind the houses on the right-hand side there are 18 privies belonging to them and to the dwellings of the adjoining street. Many of the privies are badly constructed, and allow the percolation of soil through the masonry. These conveniences communicate directly with the court drains by branch drains passing underneath the floors of some of the houses, and were either not trapped at all, or so inefficiently done as to afford no obstacle to the escape of the poisonous effluvia which filled the interspaces between the houses, and found a ready entrance at all times into them by means of the back doors. The extent of these evils will be better understood from the accompanying plan (see Figure 2). It would indeed be difficult for human ingenuity to contrive and arrange a set of conditions more thoroughly unhealthy, or more likely to predispose the inhabitants to epidemic disease. Sixty-six houses shut in on two sides by a graveyard, on the other two sides by the adjoining buildings, honeycombed with cesspools, the atmosphere of the dwellings and courts polluted by the continued admixture of putrid exhalations from a number of open conduits, so as to impregnate the whole air both internally and externally with a strong cesspool odour, notwithstanding the use of chloride of lime for the purpose of abating the nuisance; add to these things a deficient and poisonous water-supply, and an overcrowded population, and there will be no difficulty in accounting for the catastrophe which followed. I subjoin on the following page the statistics of the attack which took place on the 10th of June, 1849, sent to me by Mr. Williams, medical officer of the district, to whom I am also indebted for the plan of the locality.

A more deplorable event perhaps never occurred than these tables describe. A very slight consideration of the whole circumstances



Figure 1 Redcross Street in 2002. Photography by Mary Shaw.



Plan of Courts in Red-Cross-street, Bristol, showing the position of the privies, drains, gully-holes, and burial-ground. The deaths from Cholera are marked by black discs, the recoveries by crosses.

Figure 2

is in my opinion sufficient to prove that this great sacrifice of human life was occasioned by ignorance or negligence, as flagrant as any which from time to time gives rise to railway or other accidents. A glance at the plan will show that something like sanitary improvements had actually been contemplated; and no doubt it was believed that the object would be attained if only a sufficient number of drains and privies were constructed. Like every other step taken in a false direction, the so-called improvements increased the evil they were intended to mitigate, and, with the other circumstances above detailed, caused the untimely death of many innocent persons (see Table 4).*

Table 4 WELLINGTON-COURT

Houses—Left side			Houses—Right side		
No.	Cases	Deaths	No.	Cases	Deaths
1	—	—	1	3	1
2	3	3	2	1	1
3	—	—	3	1	1
4	2	1	4	—	—
5	—	—	5	1	1
6	4	—	6	1	1
7	1	—	7	1	—
8	—	—	8	1	1
9	1	—	9	1	—
10	—	—	10	—	—
			11	2	1
Total	11	4	Total	12	7

The three deaths in No.2, on the left-hand side of the court, took place in a family who had just removed from Gloucester-court. An inspection of the plan will show at once why the left-hand side should have suffered less than the right. It will be seen that the latter has a row of open privies behind the houses, and that a death took place in every house under the floor of which a drain passed (see Tables 5 and 6).

Table 5 WELLINGTON-BUILDINGS

Houses—Left side			Houses—Right side		
No.	Cases	Deaths	No.	Cases	Deaths
1	1	—	1	2	1
2	—	—	2	2	2
3	—	—	3	—	—
4	1	1	4	1	1
5	3	1	5	2	—
6	—	—	6	—	—
7	1	—	7	1	1
8	3	—	8	3	2
9	—	—	9	4	1
10	2	—	10	5	—
11	2	1			
12	—	—			
Total	13	3	Total	20	8

* Notwithstanding the terrible warning given in this case, and the temporary measures adopted at the time, I learn from Mr Clark's report on Bristol, which I have seen while this sheet is passing through the press, that within twelve months after the catastrophe everything has reverted to its old condition, and were cholera to recur it would find its former haunts ready to receive it!

Table 6 GLOUCESTER-COURT

Houses—Left side			Houses—Right side		
No.	Cases	Deaths	No.	Cases	Deaths
1	Uninhabited*	—	1	2	2**
2	Ditto	—	2	1	—
3	Ditto	—	3	5	1
4	Ditto	—	4	—	—
5	Ditto	—	5	1	1
6	5	3	6	1	—
7	2	—	7	—	—
8	—	—	8	4	4
9	2	1	9	—	—
10	—	—			
11	1	—			
12	1	—			
13	3	2			
14	5	—			
Total	19	6	Total	14	8

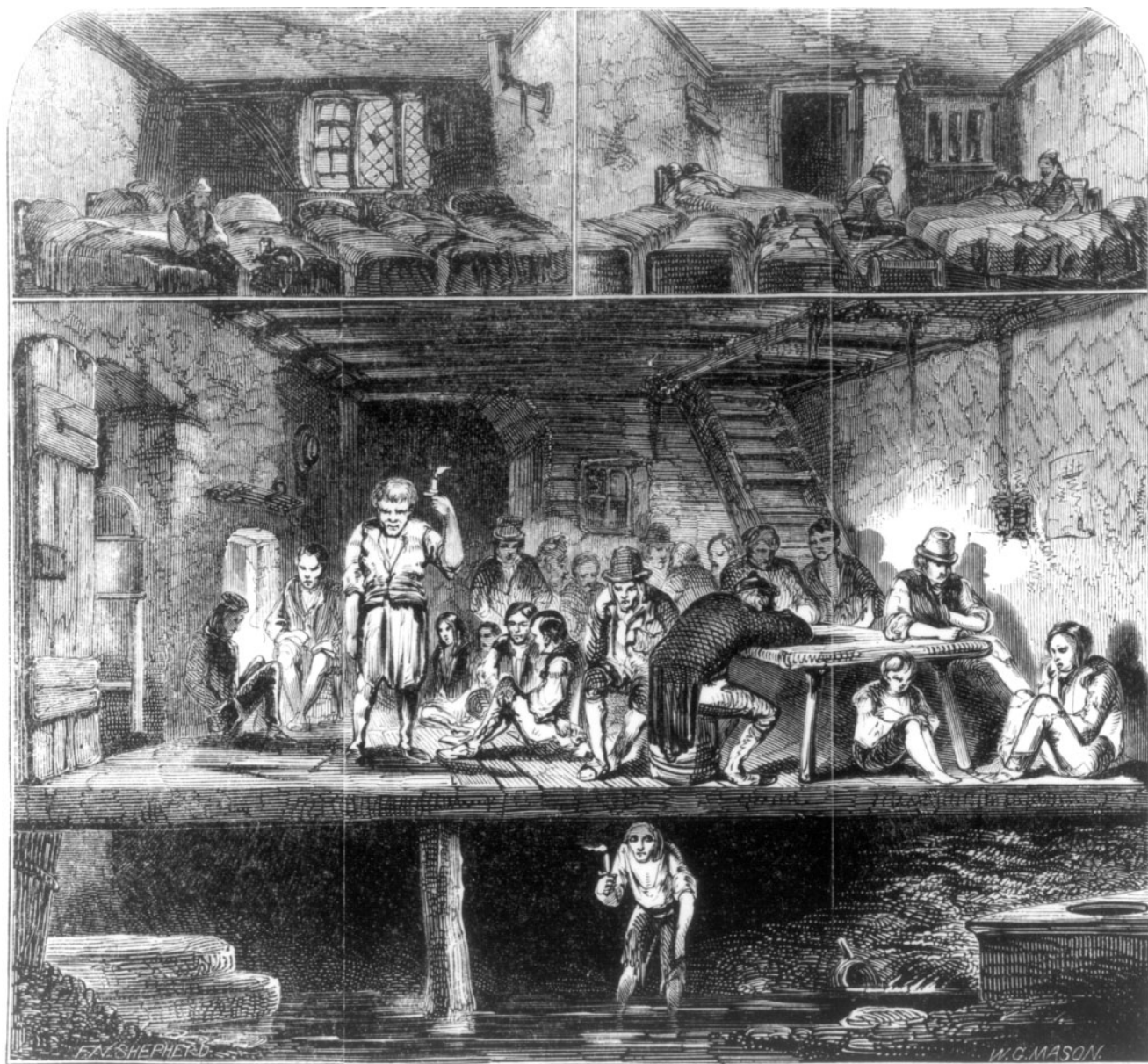
* The inhabitants of the first five houses fled on the appearance of the disease, and none of them suffered.

**These deaths took place immediately after the family had left Gloucester-court, on account of the attack of cholera. The only two privy-drains which pass under the houses are those in No. 1 and No. 8 on the right-hand side, where the greatest mortality took place.

The following is a summary of the attacks:

Courts	Inhabited Houses		Cases of Cholera	Deaths
	Attacked	Free		
Wellington-court	14	7	23	11
Wellington-buildings	15	7	33	11
Gloucester-court	13	5	33	14
Totals	42	19	89	36

The total number of deaths from first to last was 44.



FIELD-LANE LODGING-HOUSE.

Open sewer running under lodging house in Field Lane, London. Reprinted with kind permission Guildhall Library, Corporation of London