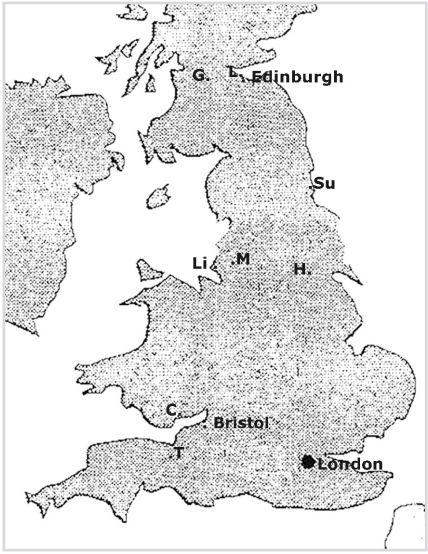
DOCUMENT 10–II (Online Companion)

Extracts from Appendix A (Report of Dr. Sutherland) to the General Board of Health's *Report* on epidemic cholera in Great Britain during 1848 and 1849

John Sutherland (1808–91) was born and educated in Edinburgh, Scotland. He became a Licentiate of the Royal College of Surgeons of Edinburgh in 1827 and a physician in 1831 when he completed requirements for the MD at the University of Edinburgh. After many years abroad, he married Sarah Cowie from Lancashire and began practicing medicine in nearby Liverpool. In late summer 1848, Lord Carlisle, president of the newly constituted General Board of Health, recruited Sutherland as a full-time medical inspector.

The board ordered Sutherland and Richard Grainger, the other full-time inspector, to sail for Hamburg. Asiatic cholera had reached this port city on the Elbe River earlier in September 1848. The board sought reliable information on the success or failure of various sanitary measures undertaken by Hamburg authorities. On the eve of their departure, however, the board dispatched Sutherland and Grainger to Hull and make inquiries into several suspected cases of Asiatic cholera aboard a vessel recently arrived from Hamburg. Was the disease contagious or not? After completing their inquiry, the board directed Grainger to proceed alone to Hamburg whilst Sutherland travelled to Sunderland to investigate more suspected cholera cases in another vessel from Hamburg. A telegram from the board on 6 October-caused him to suspend his inquiries: Asiatic cholera had erupted in Edinburgh. Sutherland left immediately for his home city.

During the subsequent eighteen months, Sutherland conducted inspections in forty towns plus associated villages throughout the United Kingdom.



Map Key
C Cardiff
G Glasgow
H Hull
L Leith
Li Liverpool
M Manchester
Su Sunderland
T Taunton

[1] In Edinburgh . . . I learned that two cases of cholera had occurred simultaneously, one in an underground flat of a house, . . . [the second] in a wretched lodging-house in a narrow, filthy cul-de-sac . . . . This latter case took place under the same roof and within a few feet of the spot from whence the epidemic of 1832 commenced its career. . . . Cholera, true to the laws by which epidemics are governed, followed the usual track of the fevers by which Edinburgh and Leith are scourged, locating itself in the same filthy **closes**, occupying the same ill-ventilated, over-crowded tenements, not infrequently carrying off its victims from the self-same rooms which its fatal ravages nearly depopulated in the epidemic of 1832. . . .

closes: Non

[3] Sufficient evidence will presently be advanced to show that cholera is by no means so capricious [3/4] in its attacks as has been gener-

[1] John Sutherland, *Appendix A* to GBoH, *Report on the Epidemic Cholera of 1848 and 1849* (London: HMSO, 1851); 164 pages. Square brackets in text contain page numbers.

Many Fixed Laws of Epidemic Cholera Are Still Uncertain

ally 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*. . . . [This is the] property which is possessed by certain states of the [epidemic] 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.

But Localization Is a Known and Indisputable Law

Indications of the Prevalence of an Epidemic Constitution

[4] During the late epidemic, the following were among the more frequent indications of the prevalence of an epidemic constitution: General malaise; uneasiness of stomach and bowels; slight dyspepsia; flatulence; derangements of nervous and vascular systems . . . ; sometimes a tendency to sore throat or symptoms approaching those of influenza; an open state of the bowels, proceeding to a 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 [individual] 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. . . .

[5] 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 . . . 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 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 then destructive, and one of their special objects seems that of arousing mankind, by signs which cannot be mistaken, to a sense of the recognizing 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. The instinct of self-preservation leads them to inquiries and physical reforms which remove those material causes from which originates a debased state of health, both of body and mind.

Predisposing Causes: Local, Unhealthy Conditions Associated with Fatal Outbreaks of Cholera

Epidemics invariably haunt the same localities. . . . [6] The severe manifestation of the presence of cholera . . . [7] 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. 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, [and] 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.

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. It has often been remarked that the wards of cholera hospitals have shown a considerable proportion of robust men and women amongst their occupants. . . .

Two Classes of Cholera Attacks
1. Predisposing Cause + Susceptibility
and
2. Presumed Contagion

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 [7/8] presence in such places for a certain time [was] sufficient to produce death. To this class of cases belong a number of the presumed instances of contagion. We have thus two attacks—the first taking place

Localization: The Intensification of an Epidemic Influence by Unsanitary Conditions

in persons habitually living in unhealthy situations, in whom the addition of the epidemic influence to preexisting susceptibility had produced a fatal result. In the second class, the simple fact of an individual being exposed to the influence of an affected locality, 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: . . . Under the unhealthy conditions mentioned above, the epidemic [influence] has the power of intensifying itself or, in other words, multiplying its force of attack, until at last it produces results closely approximating 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.

Question
Given scientific knowledge at the time, does Sutherland's hypothesis offer credible chemical and physiological pathways for the propagation of epidemic filth diseases?

Lungs and Stomach As Possible Entry Points for Organic Impurities in Unsanitary Places

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 measures of prevention. . . .

Indications of an Epidemic Influence in England before the Cholera Epidemic

In the end of the summer and early part of autumn of the year 1848, unequivocal appearances manifested the presence of the epidemic influence on several points of the east coast of England. Occasional outbursts of diarrhoea took place in several towns, and I have been informed that in a village . . . where an epidemic typhus raged, a number of cases suddenly assumed symptoms closely resembling those of cholera. At this period, the cholera was ravaging the cities of northern and western Europe, and it appeared as if the disease were making unsuccessful attempts to locate itself in this country. In the latter end of August and early September, one or two cases of a very suspicious character took place in Hull, but the disease showed no dis[8/9]position to establish itself at that time. In the course of the month of September, the city of Hamburg was suffering severely. And as a good deal of steamboat intercourse exists between that place and Hull, it happened, as was to be expected, that several cases were imported into [Hull], which afterwards proved fatal in different inns and lodging houses, but in no one instance was there any spread of the disease by contamination.

Examples of Localizing (Predisposing) Causes of Cholera

1. Dietary Errors

At this period, . . . a Prussian **barque** [small sailing ship], the *Pallas*, had been laid up for a length of time in one of the Hull docks in consequence of the Danish blockade. Her captain resided [in Germany], and when the blockade [cordon sanitaire] was removed, he engaged nine men to accompany him to Hull in order to man the vessel. He brought these men to Hamburg by railway, kept them from entering the town, and conveyed them to the river side, where he hired a boat and saw them rowed out to the steamer which lay in the river. In the course of the evening, the vessel drew up to the landing for the purpose of taking in part of her cargo, and three of the men went on shore. They slept at a public house not far from the quay, and next morning at six o'clock the captain found them all on board quite sober and in good health. At this time there was a good deal of cholera on board the merchant ships in the Elbe, the river appearing to be the centre of the epidemic attack. But none of the men referred to had been in contact with any affected individuals. They had, however, remained upwards of fifteen hours on the river. The vessel sailed for Hull and had on board a quantity of plums for the market, of which the men ate largely on the passage. Early on the morning of the second day after leaving Hamburg, the steamer arrived at Hull. The men went on board the *Pallas* the same afternoon. . . . At nine o'clock the next morning, the captain was . . . informed that one of the men was dying. He was in a state approaching collapse and died the same night. Within little more than twenty-four hours afterwards, [an]other four of the crew were attacked, two of whom died. The rest of the men were sent on shore and suffered more or less from diarrhoea, which, however, easily yielded to treatment. The *Pallas* was closely wedged in amongst other vessels and all communication with her was forbidden.

The "Pallas" Incident: An Illustration of the Non-contagious and Localizing Nature of Cholera

Had the disease been contagious, the precautions which were taken could hardly have prevented it from spreading, especially as the crew had actually slept two nights in the town. But no such occurrence took place. . . . The advocates for the contagious nature of cholera might possibly find countenance for their views in the fact stated, that a number of the men went on shore in Hamburg into the very neighbourhood where the disease was raging at the time. But it happens that of the four most severe cases, three of which terminated fatally, not one of the sufferers had been on shore at all; although the fifth and slightest case, who recovered after a few hours of illness, occurred in . . . one of the men who had been on shore and who was, moreover, the individual last attacked.

The simple facts of the case appear to explain the whole occurrence. The men were brought from a healthy town into an epidemic centre, where they remained a sufficient time to have the [bodily] constitution thoroughly affected by its influence. Possibly, they [9/10] might have resisted the morbid state had it not been for the very serious error as to diet which they committed. The eating of a few plums would certainly, under ordinary circumstances, have produced no such fatal results. But during an epidemic

constitution, such indulgence is well known to be fraught with extreme danger.

The General Board of Health requested that the sanitary state of the town of Hull be examined in order to ascertain whether any serious public danger existed. After a careful inquiry by Mr. Grainger and myself, we were able to report that the class of diseases which were then prevalent in the town, and had been for some time previously, afforded no ground for alarm. . . . The cholera cases had been imported, just as any other form of disease might have been, they presented no evidence whatever of being contagious, and nothing further was necessary than to organize such preventive machinery as the westward progress of the epidemic indicated as desirable. . . . I look upon the evidence of the non-contagious nature of cholera, and of its dependence upon an epidemic constitution and suitable localizing circumstances in the population, as afforded by the whole history of the disease in Hull, to be perfectly conclusive.

Cholera Is Non-contagious and Develops Only in Suitable Localizing Conditions

In the beginning of November 1849, cholera visited the town of Taunton under such circumstances as to afford valuable experience in regard to the effect of specific localizing causes. Though requiring improvement, the town itself was generally in a much better state than others which had been attacked by the disease. At one extremity of [10/11] Taunton is situated the workhouse, and at the other the county prison, the sanitary conditions of which differed most materially from each other. The whole population of the town does not much exceed 16,000. From its small size we have the best possible means of judging of the effect of the epidemic influence on three classes of people: The inhabitants of the town, the inmates of the [Poor Law Union] workhouse, and the prisoners within the walls of the gaol.

2. Overcrowding, Defective Ventilation, and Lack of Personal Cleanliness

From the absence of any marked of any marked localizing cause, the population generally was not greatly predisposed to attacks of the disease, and the only result was the occurrence of cases of diarrhoea.

Very different was the fate of the inmates of the [Union] workhouse, the arrangements of which were such as could not fail to be productive of disease. The situation occupied by the building was badly drained, the refuse being carried by a sewer to a cesspool in the garden, which was uncovered till a short period before the attack of cholera began. The house is remarkably low and consists of a front building, with branches or rays which project into the yard behind. This yard is surrounded by low, badly constructed sheds which were used partly as offices, partly for wards; in one of them is situated the girls and infants' schools belonging to the establishment. The internal arrangements of the house are exceedingly defective. Its passages and staircases are not constructed to facilitate ventilation. . . . The water closets opened into the wards or staircases, and in the sick ward this convenience formed part of the ward itself. . . . The ventilation of the wards was very bad, and the population overcrowded . . . . The greatest degree of overcrowding existed in the girls' schoolroom, which was a slated shed, 50 feet long, 9 feet 10 inches broad, and 7 feet 9 inches to the top of the walls, over which was a sloping roof. In this miserable place were huddled together 67 children, with about 68 cubic feet of air to each. The infant school, which was situated under the same roof, was only fit for a coal cellar. The means and appliances of personal cleanliness within the workhouse were defective. [No washbasins, etc.] . . .

[12] The result of these causes in predisposing to disease is fully exemplified by the following evidence . . . . About two weeks before cholera appeared, bilious diarrhoea prevailed in the workhouse. Early in October it began to advance and a man died of dysentery. The first case of cholera occurred on 3 November [1848], and in ten minutes from the time of seizure the sufferer passed into a state of hopeless collapse. Up to 4 p.m. of 5 November, no fewer than 42 cases and 19 deaths had taken place. In the course of one short week, 60 of the inmates were swept away. The girls' schoolroom, which was by far the most unhealthy part of the building, furnished the largest proportion of victims. . . .

[13] Let us next contrast the position of the county gaol with respect to the prevailing epidemic. I found the cells occupied by prisoners in the new part of the building had . . . 819 cubic feet [or air per prisoner]. The cells in the other parts of the building had . . . 935 cubic feet [per prisoner]. . . . A system of ventilation passes through every cell and a temperature is maintained that hardly varies three degrees in 24 hours. Each prisoner has the means of personal cleanliness. He has a water closet, wash basin, and unlimited water supply. He has a good diet and cleanliness is strictly enforced throughout the building. . . . During the presence of the epidemic in Taunton, not a solitary case either of cholera or diarrhoea occurred among the prisoners in the gaol. [13/14]

Opportunities rarely offer, such as those afforded by the instance before us, of testing the truth of the principles of preventive science. There were three classes of persons living under different circumstances: 1. Those within the walls of the gaol, although in confinement, were surrounded by the appliances of health. 2. The population of the town, many of whom inhabit dwellings whose sanitary condition is by no means so good as that of the prison. 3. The unfortunate inmates of the workhouse, who were exposed to almost every conceivable disadvantage in regard to health. The results were: Perfect safety to the first from the lightest touch of the epidemic; the townspeople escaped with some cases of diarrhoea, but without a solitary instance of cholera; while out of 276 inmates of the workhouse, no fewer than 60, or nearly 22 per cent, died of cholera within a single week, and nearly all

Question
Does this distribution of cholera cases in Taunton constitute a natural experiment?

of the survivors suffered to a greater or less extent from cholera or diarrhoea.

3. Unwholesome Water

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**. . . .

organic matter: Considered the most reliable evidence of contamination, especially sewage, if found in potable water.

While cholera was prevailing in Manchester, a sudden and violent outbreak of the disease took place in Hope Street, Salford [a western suburb], 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**. The table on [the] next page 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 good; and where it is designated as "pump-water," the people had used the water complained of. [14/16]. . . [One] complainant states "that he was afraid of using the pump-water [because] the water in which the bedding of two persons who had died of cholera had been washed had 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. . . .

Currie: Probably John S. Currie, seconded from Blackburn, 25 miles north; LRCS, Edinburgh (1828).

pipe supply: Water from a remote source, pumped under pressure to homes and/or courts.

4. Injurious Effects of Town Refuse

The advocates of sanitary improvement have long asserted that the exhalations from town refuse have a direct effect in lowering the standard of public health, in predisposing to epidemic attacks, and to the slower but no less fatal operation of other diseased conditions. We should expect, therefore, that

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.	Diarrhœa Cases.	Cholera Cases.	Deaths from Cholera.
(East side of Street.)				
No. 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
No. 40 to 42	—	—	—	—
Derbyshire-court	—	1	—	—
No. 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.)				
No. 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,				
No. 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 Diarrhœa 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.

Question
Do Mr. Currie's inquiries constitute a natural experiment on effect of impure well water, similar to what Grant and Snow claimed for Surrey Buildings (Documents 2–II and 3)?

Mr. Currie's Table of House-to-House Inquiries into Water Supply in Salford, Manchester

persons living close to accumulations of such refuse would suffer severely, especially if an epidemic happened to touch the neighbourhood. To illustrate this fact, and at the same time to demonstrate the extreme importance of the sanitary principles involved in the cleansing operations so strenuously, and in some instances so fruitlessly, put forth by the General Board of Health in its regulations and notifications, I shall select one very melancholy and striking instance of the fatal results arising from the neglect of its orders in this particular: . . . [the muck garths of Witham, Hull, excerpted in Document 10]. . . .

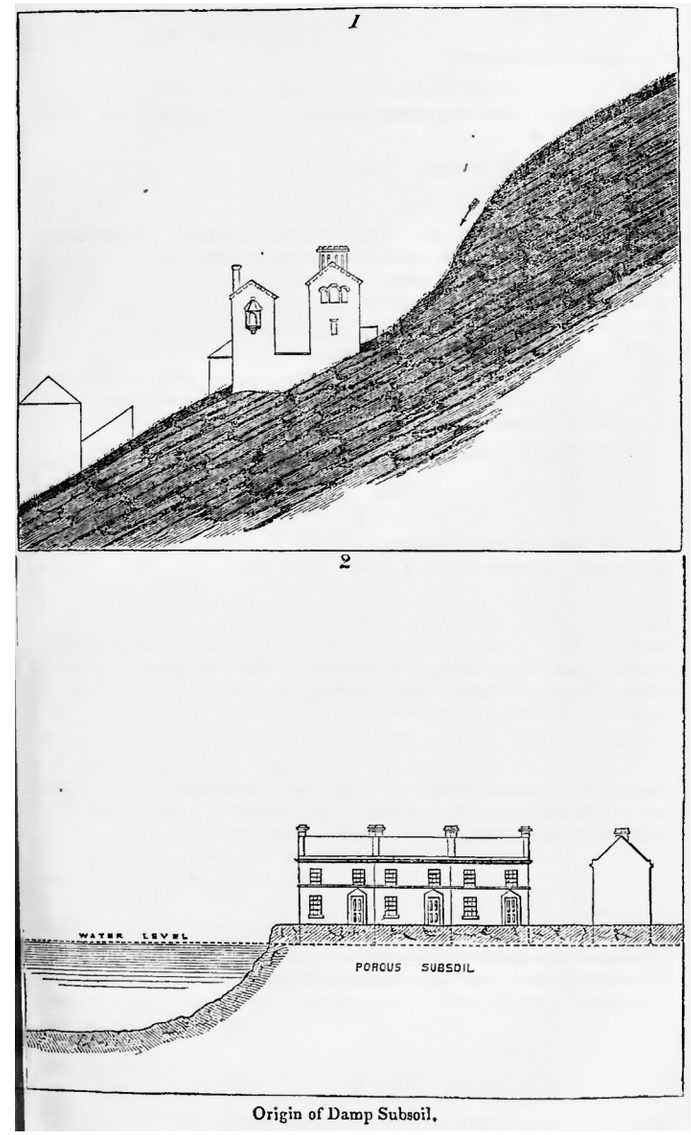
5. Dampness in the Subsoil

[18] A very frequent cause of the localization of cholera is dampness in the atmosphere, especially such as proceeds from the proximity of river banks and the presence of water in the subsoil on which the houses are built. One or other of these causes is present in a great majority of instances, but the effect of a wet subsoil and certain conditions from which it arises have not hitherto attracted that degree of attention which their importance merits. . . .

6. Defects in the Internal Economy of Large Tenements

[21] In the Scotch cities it is found that a great deal of epidemic disease occurs at the top of the loftiest tenements, where a comparatively pure atmosphere surrounds the dwellings. In order to elucidate this fact, it will be necessary to inquire into the internal arrangement of the buildings. . . . Houses with eight or ten successive nests of families, piled one above the other, are by no means uncommon. . . . The "lands," as they are called, have generally one common stair to give access to their teeming population, a circumstance which must always render a thorough cleanliness of these approaches next to impossible. Many of the stairs and the passages which branch off from them are dark and noisome. And from the absence of all domestic conveniences [toilets] in the houses, they become depositories of filth of the most disgusting kind. The atmosphere in them is most impure and often extremely offensive. And as the houses must be supplied with air through these channels, we need not be surprised to find that the supply is at times almost intolerable. The same want of conveniences leads to a most abominable state of the **closes**, which all police regulations have hitherto failed to improve materially, especially in Edinburgh, so that the ordinary channels through which the atmosphere reaches the inmates, even in the loftiest [21/22] and apparently best ventilated parts of the old town of Edinburgh, are impregnated with the impurities dissolved and carried along by the air.

There is no household water supply to this class of tenements either in Edinburgh or Glasgow. The small quantity made use of is procured from public wells or stand pipes in the streets or closes. [It] has to b e carried to considerable altitudes, so that the amount of labour required is a direct inducement to use as little water as possible. Were the whole *requisite* supply



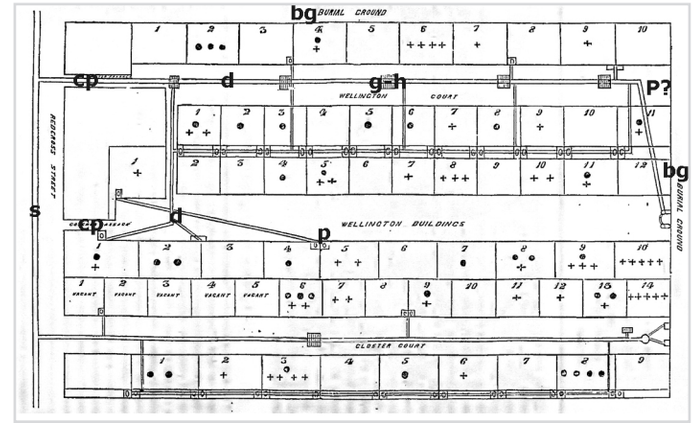
Origin of Damp Subsoil.

procured in this way, it would entail on each family the transport of between two and three hundred-weight of water a day to the height of 60 or 80 feet. There are no means provided by which the solid and fluid egesta of the households can be removed, except by the laborious process of carrying down the whole weight which had previously been carried up. There are neither water closets, sinks, not dust-shoots. The result of the want of these most needful conveniences is that all the offensive refuse of the house must

be retained within the inhabited apartments and in immediate proximity to the scant water supply. The atmosphere is rendered damp and foul by the exhalations, and the water unwholesome by absorbing them. It is true that the police send round carts for removing the refuse. But under the best possible arrangements of this kind, the house refuse must still be retained sufficiently long to be injurious, while the inmates not infrequently find themselves inconvenienced by the operation of conveying it down from such an altitude at the precise moment fixed by the police for its removal. The practical result is that it is often retained as long as possible, or thrown out of the windows into the closes below. It is even not a rare occurrence to find large accumulations of decomposing matter, which appears to have lain for years, in garrets and empty apartments of these lofty houses.

These circumstances fully explain the reason why large tenements are so liable to epidemic disease, apart from considerations of drainage and surface cleansing. But there is yet another element of unhealthiness in the overcrowded population which inhabits them, and in the entire absence of any means of ventilation. Where there are a large number of families, there must be a corresponding number of fires burning at all seasons, [with the result] that the temperature of the whole internal atmosphere is higher than that without [the building]. There is a constant tendency of this warm impure air to ascend toward the higher flats by the staircases, through crevices in the ceilings, and even through the floor and plaster, both of which are porous. . . . I had been several times so forcibly struck with the occurrence of epidemic disease in the loftiest parts of Edinburgh, that when cholera appeared in Glasgow, I requested the district superintendents of the city parish to keep records of the precise flats in which the cases occurred. The results of this classification have confirmed the above views . . . . An account of the precise localities of 1,106 cholera cases was kept . . . . [23] The sunk flats are too few in number to give a result, but the relative unhealthiness of different stories stands as follows: The middle floors are the most healthy, as being equally removed from the effects of the upward drainage of foul and unwholesome atmosphere, and the offensive exhalations from the uncleansed and undrained streets below. From their greater proximity to the latter cause of disease, the ground flats rank next in unhealthiness.; while the top flats from becoming, as it were, cesspools for the aerial drainage of all the stories below, were found to be by far the most liable to attacks of epidemic cholera. . . .

The first outburst of cholera in the city of Bristol took place in three courts in Red Cross Street, . . . [consisting of] six 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;



Plan of Courts in Red Cross Street, Bristol

bg burial ground
cp covered passage
d drains
g-h gully-holes (grates)
p privy (latrine or toilet)
P? Possible location of water pump
+ cholera recoveries
• cholera deaths

(Adapted from original)

two out of the three courts are entered from Red Cross Street by narrow covered passages about ten yards in length, the third court being open. Were there no other unfavourable circumstance than the position which these courts occupy, it would be sufficient to account for their unhealthiness [due to] 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 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 [23/25] 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. . . .

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. [These drains] were either not trapped at all, or so inefficiently done as to afford no obstacle to the escape of poisonous effluvia which filled the inter-spaces 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. It would indeed be difficult for human ingenuity to contrive and arrange a set of conditions more thoroughly

Questions
Why does the drainage plan omit the location of the water pump in Wellington Court? Does this drawing reflect the theoretical assumptions of the person who made it?

trapped: Drains fitted with U-shaped devices which, when filled with liquid, prevent the upward escape of sewer gases.

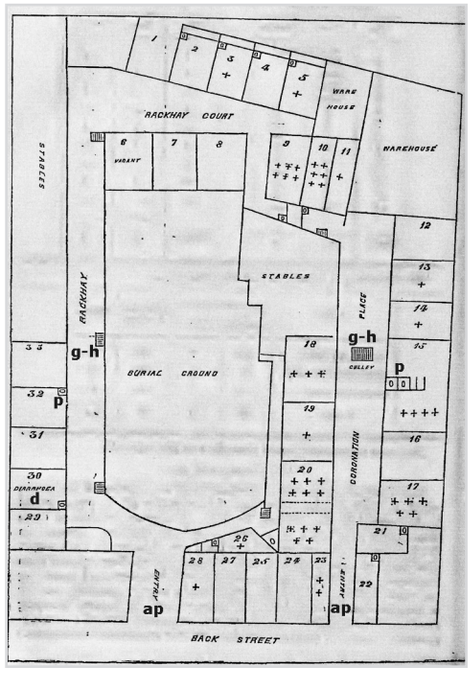
gully grate: "Gully-hole, the opening from the street into a drain or sewer" (*OED*).

soil: In this context, urine and excrement.

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 [are] 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 accounting for the catastrophe that followed. [A total of 89 cases of cholera, 36 of which were fatal, in the three courts; 42 of 61 inhabited houses had at least one case.]. . .

[27] Bristol affords more than one example of an outburst of cholera in which a chief exciting cause was the existence of an overcrowded burial ground in the affected locality. The most striking of these illustrations is afforded by a place called the Rackhay, . . . an irregular square of buildings, entered from the street by an arched passage, and having a burial ground occupying the whole center of the square . . . . [29] The surface of the earth in it is about 4 1/2 feet above the level of the pavement in the courts. It is completely surrounded by houses. There are drains with open gully-grates close under the external walls, the odour from which was most offensive and had an unmistakable graveyard smell. . . . A number of offensive privies are contained in the houses . . . . Up to the end of the attack [in July 1849], the number of cases was as follows: cholera, 47; deaths [from cholera], 33; recoveries, 14. . . . It will be seen, by reference to the plan, that the disease confined itself chiefly to the houses on the right hand side of the burial ground, where the attack ran its course with great severity. Had it continued for a longer period, it is probable that not a house would have escaped as diarrhoea had begun to appear in the houses on the left hand side. At that period, . . . the neighbouring localities escaped with the exception of one small district close to another [29/30] burying ground . . . .

8. Graveyards



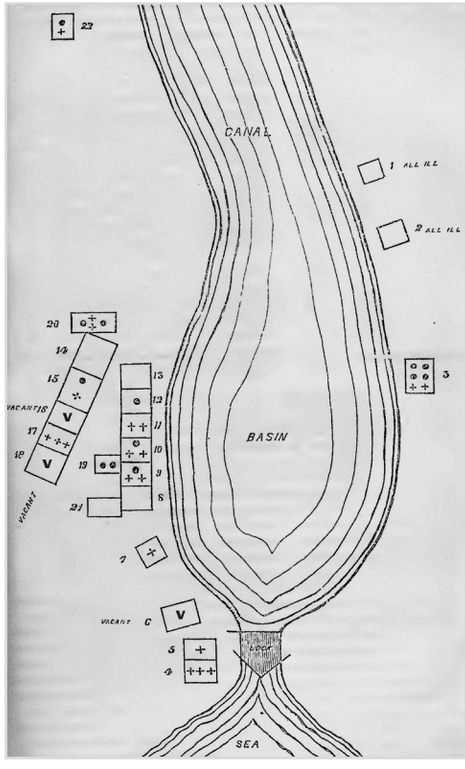
Plan of Rackhay and Coronation Courts, Bristol
ap arched passages
d diarrhoea
g-h gully-holes (grates)
p privy (latrine or toilet)
+ cholera cases (recoveries & deaths)

(Adapted from original)

[30] While epidemic cholera was prevailing in the town of Cardiff in the month of June 1849, a sudden attack of the disease took place at a locality about a mile and a half distant from the town under circumstances which could leave no possible doubt as to the *exciting* cause in that special instance. There is a considerable tract of unoccupied land between Cardiff and the sea through which the canal passes, and at the point where it enters the sea there is a lock and basin, on either side of which are a number of houses. There are also houses at some distance from the line of the canal, but they are exposed to conditions in every respect similar to the rest with the single exception of their being place d beyond the reach of any exhalations which might arise from the canal. If the outbreak about to be described had arisen from merely general causes, the probability is that all the neighbourhood would have suffered equally. But every house escaped except those close to the side of the basin, and the reason of such selection will be sufficiently obvious. . . .

On 26 May, the end of the canal nearest the sea was emptied in order to admit of repairs of the lock. By this process a large surface of black, putrescent mud was exposed to the direct action of a hot sun. The result was that very offensive effluvia were immediately perceptible. . . . The smell was complained of by the inhabitations of all the adjoining houses and produced a variety of symptoms . . . [including] general prostration, coldness, tremors, vomiting, diarrhoea, cramps in the bowels, [thirty-three cases of] developed

9. Exhalations from Putrescent Mud



Sketch of Sea Lock and Canal Basin, Cardiff
v vacant house
+ cholera recoveries
• cholera deaths

(Adapted from original)

cholera, and death [in thirteen instances]. . . .

10. Drunkenness & Fatigue—the "Volant" Incident

[32] The influence of habits or acts of intemperance in occasioning attacks of cholera has long been fully recognized. It will therefore be unnecessary for me to do more than give a few general conclusions and illustrations from the experience of the late epidemic. A striking instance of the fatal results of drunkenness occurred on board a vessel in the **roadstead** of Sunderland early in October 1848. This vessel had arrived from Hamburg and one death had occurred on board shortly after leaving port. She was consequently put in quarantine. I went alongside of her in a small steamboat for the purpose of making the needful inquiries. I saw all the crew, who appeared to be in perfect health. One middle-aged man was especially communicative and afforded a good deal of information in regard to the vessel. I gave the people instructions how to act in case the disease should again appear, and [32/33] especially cautioned them to avoid intoxication, which would lead to certain death. . . . Immediately after I left, the man referred to went down to the forecastle, where he had secreted a bottle of brandy at Hamburg, and drank a large quantity. In an hour or two afterwards he was collapsed and died the next morning . . . . In every fresh outburst of cholera, persons of dissipated, intemperate habits have been the first to fall victim to the disease . . . .

During the prevalence of an epidemic constitution, fatigue is a powerful predisposing cause to attacks of cholera. . . . Persons engaged in iron forges and other equally laborious occupations have suffered in large proportion. The length of time during which the exertion is continued appears to be a more important element than the actual amount of work, and hence it has been necessary in a number of instances to place the men on what are called short shifts.

From want of attention to this matter, casualties have occasionally taken place among nurses in hospitals, and this class of cases is sometimes ranked amongst the results of contagion by inexperienced observers. Medical men have also suffered from a similar cause. I am not aware that any individual died while acting under my own special instructions, and I attribute this favourable result to my having endeavoured to impress upon them the necessity of avoiding over-exertion . . . . I am sorry to say that I have known instances where a different course was pursued from inadvertence. . . .

[34–40] Brief abstract of localizing causes of cholera [in each city and town inspected by Sutherland]. . . .

Localizing Causes of Cholera in the London Metropolis

London. Previous to the introduction of the preventive measures into the metropolis, I was directed by the General Board of Health to inspect districts most affected by the epidemic. The experience derived was most instructive, as it proved to [be] a demonstration that wherever the favouring conditions existed, the epidemic selected its victims from all classes of the population. In most other cities, the worst districts are in inhabited by the lower classes. But in some parts of [40/41] the metropolis, the great thoroughfares are inhabited by people in easy circumstances, while the immediate vicinity is crowded with the lowest class of houses. There are certain circumstances, however, common to all the inhabitants. These are inefficient [street] drainage, cesspools under or close to the houses, a subsoil saturated with organic matter, and not infrequently large accumulations of refuse in the cellars or basement of the dwellings themselves; the proximity of trades dangerous to health, which are permitted to be carried on without control; overcrowded graveyards; and defective water supply.

These causes affect the health of the entire community in certain parts of the metropolis, and I have little doubt that all classes of the population within the limits of the **epidemic seizure** suffered in a nearly equal proportion. The same classes in the higher, better drained, more open and healthy parts of the metropolis either escaped the cholera entirely or were only affected by the milder diarrhoeal stage. But even over the extensive surface covered by the epidemic, there were some spots in which the sanitary conditions were more than usually bad. The population crowded together, offensive ditches and sewers running close to the houses, the proximity of nuisances, and other similar circumstances determined the selection of such spots for the special ravages of the disease.

Certain local peculiarities also had a most marked and fatal effect upon the population. The south bank of the Thames, from its low level and utterly inefficient drainage, which, indeed, does more harm than good, suffered greatly and afforded an instance of the injurious tendency of ill-advised sanitary works. The localities most affected are built on the ancient mud deposits of the river and on made [artificial] ground, which appears to be composed of unwholesome refuse of various kinds, the whole subsoil being more or less charged with organic matter. The water supply in many instances was discoloured and very foul. London, indeed, affords illustrations of almost every imaginable sanitary defect and negligence. Those local causes of disease where are met with, either singly or combined in small proportion, in cities and towns in other parts of the country, are collected together within the circuit of the metropolis. I know of no locality in which the influence of conditions injurious to health can be studied under a greater variety of aspects, or their effect on the propagation of epidemic diseases more distinctly traced. . . .

[42] The epidemic was no respecter of classes, but was a great respecter of localities—rich and poor suffered alike or escaped alike, according as they lived in the observance or violation of the laws of their physical well-being. If, then, it be a law of the epidemic to attack only such parts of

Localizing Law Makes Epidemic Diseases Preventible Via Sanitary Improvements

towns as are in a bad sanitary condition, and to leave the healthy portions untouched, or nearly so, it is perfectly obvious that if it be within the power of art to raise the sanitary condition of the districts which suffer to that of those which escape, it must be possible to ensure the entire population of towns the same immunity from epidemic attacks which is now enjoyed by only part of the population.

Results such as these can only be obtained through permanent sanitary improvements, though beyond all doubt they can be approximated to by the rigid enforcement of cleansings, removal of nuisances, and other means. But in order to make temporary sanitary ameliorations effective to the preservation of human life, they ought to be in operation for some time before the epidemic prevails in the district. In the great majority of cases, however, the most extraordinary apathy existed in regard to this matter. It was generally thought sufficient to begin the cleansing of bad districts of towns when the disease was in the immediate neighbourhood. . . .

Lime-washing an Effective Temporary Measure

The remarkable effects produced by lime-washing of houses and entire neighbourhoods is certainly an exception to general conclusions stated above. In the use of this measure of prevention, there could be no doubt whatever that the disease was immediately checked in many instances. Houses with filthy, damp, mouldy walls are peculiarly liable to become nurseries of fever and cholera. During [42/43] the prevalence of the former class of diseases, the utility of quicklime washing had been fully recognised. The General Board of Health, therefore, wisely ordered it to be employed as a measure of prevention against cholera [since] the favouring conditions of both types of diseases have been found to be identical. Numerous cases occurred in which considerable districts were subjected to the process, both within the houses and on the external walls, and I know of very few instances in which the disease appeared in houses which had been protected in this way. . . .

A consideration of the more prominent causes of epidemic outbreaks will show that the most powerful of them do not admit of removal by temporary means. Dampness and defective drainage can only be remedied by extensive permanent works, and a power to compel ventilation of houses and to prevent overcrowding is still a desideratum. The consequences of an impure water supply must be obviated by seeking new sources and better methods of distribution. The evils resulting from the crowding of a large number of dwellings on a small superficial area—a practice which intensifies every other cause of disease—can only be met by stringent laws and by the spread of intelli-[43/44]gence and the spirit of enterprise among that class of builders who provide houses for the labouring classes. . . .

The only escape from the fatal effects of permanent causes of disease which cannot at once be removed is to be found in . . . the removal and dispersion of the people. This practice was found to be very successful at Edinburgh during the epidemic of 1832, and it was made matter of special regulation by the General Board of Health in all the parishes affected during the last outbreak of the disease. Large roomy buildings in healthy localities were sometimes made use of. At other times, it was found necessary to erect suitable wooden sheds, and in several instances tents were used. The advantage of this method of procedure depends on the fact that cholera rarely remains long in the same district. It attacks individual houses, groups of houses, and streets; between 30 and 40 percent of the cases over a whole town occur in houses where more than one person has already suffered. In groups of houses attacked, the percentage rises very much higher, and the danger to the people by leaving them in their dwellings is enormously increased. . . . If the people be removed and kept away for a week or ten days, and if their homes be lime-washed during their absence, they may return home with comparative safety. . . .

Some Sanitary Defects Require Temporary Removal of People to Houses of Refuge

[45] The very small proportion of attacks and deaths which [occurred in several towns] is quite sufficient to prove the efficacy of the Houses of Refuge as a means of saving life. All the persons admitted into them were taken from houses where the disease had actually appeared or from their immediate vicinity. That many were powerfully under the influence of the poison of cholera is proved by the fact that a large proportion were seized with severe choleraic diarrhoea, either before or within a day or two of the time of admission. But . . . very few even of these severe cases passed into cholera. The mortality from the epidemic has varied from 1 percent to 3, 4 and even 7 percent of the entire population of towns [which used Houses of Refuge, within which the mortality was less than 0.6 percent].

Premonitory Stage of Cholera

It has been an observed fact ever since cholera became known to the medical profession that by far the greater proportion of cases are preceded by a distinct premonitory stage, varying in intensity from slight disturbance in the functions of the intestinal canal onwards to the production of symptoms of a decidedly choleraic character; and in duration, from several [45/46] days to a few hours, before the full development of the disease. . . . Many [cases], supposed to have been sudden, prove on investigation to have been preceded by a well-marked premonition.

During the epidemic of 1831–32, these circumstances did not escape the observation of the medical profession in this country. There were few points in regard to cholera on which a larger amount of concurrent testimony could be cited than the almost universal prevalence of a premonitory stage and the absolute necessity of directing medical treatment against it. . . . It became customary at the time to issue notices, warning the people of the people of the danger of delay and to open dispensaries fro

the gratuitous distribution of medicines. No doubt, many lives were saved by this procedure. The establishment of a kind of medical police, to watch over the health and sanitary condition of the people in affected districts, was first recommended by the Central Board of Health in 1831. . . . But the real importance of house-to-house visitation as a preventive measure was not at that time understood or recognised. . . . The local boards of health were more engaged in dealing with cholera as a disease than as a pestilence. Every conceivable plan of treatment was tried . . . . The result was, and still is, that in its fully developed form, cholera is a disease which admits of little aid in medicine. The real element in its management is time, to which all methods of treatment should be considered as merely subsidiary. In the early stages, there is no disease more easily manageable and in which so great an amount of human life and suffering can be saved. But in its later stages, there is hardly a disease more completely beyond human control and in which so large [46/47] a proportion of cases must inevitably perish. Cholera is, of all others, a disease which ought to be managed by preventive medicine. But it is, of all other diseases, that one in which the smallest amount of reliance should be placed on medicine simply curative. The experience furnished by the cholera of 1831–32 has been amply confirmed by that derived from the late epidemic. The existence of a premonitory stage, and the comparative ease with which the patient may be treated in that stage, have been fully demonstrated so that both may now be considered established facts of medical knowledge.

In addition, . . . strong additional evidence has been afforded of the unity of cholera throughout all its stages . . . [since it has been] "impossible to draw any line between the most severe cases of cholera and the ordinary diarrhoea prevailing" [in various localities]. . . . [49] I am aware that objections have been made against the doctrine that all diarrhoea cases occurring during an epidemic of cholera are necessarily part of the disease and fraught with danger if neglected. . . . It is quite true that every case many not be attended with equal peril to life. But there is abundant evidence to prove that the ratio of danger is determined by the locality where the cases occur, or by the greater intensity of the epidemic influence over one portion of the affected area than over another, rather than by any apparent difference in the cases. Whatever variety of opinion there may be on these points, it is practically impossible to make any distinction, at least in districts affected by cholera. . . . That individual cases have occurred in which diarrhoea has passed into the rice-water purging state, and thence into fatal collapse, notwithstanding the most active treatment, is perfectly true. But it is at the same time true that the number of such instances has been very small indeed, while nearly the whole of the fatal epidemic cases have never been seen by a medical attendant until they were either in absolute collapse or rapidly verging towards it.

If, then, in those districts where cholera has become localized, the various classes of cases must be practically considered as progressive stages of one fatal pestilence. And if experience has demonstrated that there is a constant ratio between the period at which the disease is brought under treatment and the success of the means adopted. [Then] the conclusion must be self-evident *that the whole force of the medical preventive measures should be directed against the earlier stages of the disease*. The treatment of the epidemic *as a unity* has amply confirmed the truth and paramount importance of this deduction, as the following table will demonstrate: [49/50]

Medical Intervention at the Premonitory Stage Is Effective

The data for the above table extend to many thousands cases of the disease

Stages in which Medical treatment was first applied.	Per centage of Deaths.	Per centage of Recoveries.
Diarrhœal	0·25	99·75
Choleraic	5·00	95·00
Cholera not collapsed . . .	29·22	70·78
Collapse not pulseless . . .	70·18	29·82
Collapse pulseless	86·10	13·90
Secondary collapse	97·00	3·00

occurring in cholera localities. The milder forms are not to be confounded with those which take place in the neighbourhood of, but not in, districts affected by cholera.

In order to lay hold of the disease in its early stage, two kinds of measures were recommended in Notifications and Regulations of the General Board of Health. First, the opening of dispensaries and issuing of suitable notices urging on the people the necessity of immediate attention to all disorders of the bowels. And secondly, the inspection of the population in affected districts and the immediate treatment of all persons found suffering from premonitory symptoms. . . .

[51] There are two ways in which a [51/52] system of house-to-house visitation may be carried out—the first by lay visitors, the second by medical men. The former plan was urged upon the parochial boards by the **first notification** of the General Board of Health, but the advice appears never to have been followed. The reason assigned was that it was either impossible to obtain the voluntary unpaid services of suitable persons, or if an attempt at visiting were made, it was no followed up with regularity sufficient to make it effectual. A better result was obtained from the adoption of a paid lay agency by which the cases were sought out and reported immediately to the medical officer of the district, who proceeded at once to visit and take charge of the patient. . . . But wherever the epidemic exists in force,

Two Forms of House-to-House Visitation

first notification: Document 1.

a staff of medical visitors is the one that can be relied on. The sole objection to be urged against it is the difficulty of obtaining an adequate number of gentlemen . . . . But this difficulty has never been a practical one because . . . the disease in its virulent aspect is almost invariably confined to circumscribed localities. Even while cholera prevailed in a greater or lesser degree over the vast area of the metropolis, I found that, with the exception of a few scattered cases, the great bulk of the mortality occurred within a very narrow compass in each district attacked. This was indeed the law observed by the epidemic. Besides, it seldom lasted long at any one point, but attacked a number of points in succession. . . .

Localizing Law of Cholera Makes Paid Medical Visitation Feasible

[53–56: Suggested method for utilizing lay visitors and medical officers to identify and treat suspected cholera victims.]

Special Reports on Selected Towns

[57–126: Special reports by Sutherland and district medical officers on preventive measures adopted in Dumfries, Glasgow, Manchester, Hull, Sheffield, Liverpool, Wolverhampton, Dundee, Hamilton, Glengarnoek Iron Works in Coatbridge, Carnbroc, Leeds, Sunderland, Edinburgh, and Bristol.]

Home Treatment Offered Best Chance of Recovery

[127] The results of the treatment of cases of cholera in hospital, as compared with those of home treatment, have been fully borne out by the statement made in the first notification of the General Board of Health in regard to the experience of the former [1831–32] epidemic. Namely, "the establishment of cholera hospitals was not successful." When we consider the wretched, over-crowded dwellings occupied by a great proportion of the **parochial** cholera **patients** and the apparent impossibility of bestowing on them that amount of medical care and assiduous nursing which they so much require; and when we contrast with this the great apparent advantages possessed in hospitals for the treatment of so virulent a disease, we should naturally expect the balance of recoveries to be in favour of the latter. The **parochial surgeons** had in general every disadvantage to contend with in the home treatment of cholera, while the patients in hospital were watched over with unremitting care, by night and by day, and every appliance of the healing art brought to bear on their cases. I believe that nothing was left untried which afforded the patients a chance of recovery. Yet, the statistical results of the two modes of treatment preponderate greatly in favour of leaving the patient at home. . . .

parochial patients : The destitute, dependent on a parish or union for medical services.

parochial surgeons: Medical men employed by Poor Law guardians or parish vestry.

[129] There are, however, circumstances under which some sort of hospital accommodation will perhaps always be required during cholera epidemics. This should consist of scattered rooms as near the affected houses of the worst districts as possible. A good rule to take in their selection would be to inspect carefully the usual **fever nests** of towns, [assume they will be] attacked by cholera, and [then] estimate the number of apartments [there] in which it would be impossible to treat cholera cases. [Establish temporary emergency] accommodations . . . as near to these localities as practicable. . . . I have no difficulty . . . in giving a very decided opinion against "cholera hospitals" as the special means of treating the disease. The congregating together of a number of patients labouring under a mortal pestilence, brought from all distances under any plea of humanity, must henceforth be abandoned. It is fatal to the sick and tends to impress upon cholera a much higher percentage of mortality than really belongs to it. . . . [If it is] impossible to find suitable [129/130] rooms near enough to the worst districts of the worst towns, I should make the home treatment of cholera the only alternative by providing no hospital accommodation whatever and remove the convalescents as soon as it could safely be done to proper [apartments] in an airy, healthy locality. . . .

General Board of Health Required Timely Removal and Interment of Cholera Corpses

Generally, the people appear to have been aware of the necessity of interring the body as early as possible. But in a considerable number of cases, either from ignorance or indisposition, there has been a tendency to delay. . . . [131] In a few number of cases, apparently among the Irish poor, force had to be used, . . . but these cases constituted a small minority. . . .

[132] Everyone conversant with the dwellings and habits of the poorer classes in England must be aware that overcrowding exists to a great extent in all our large towns. They must frequently have observed the strange intermixture of the dead with the living which this circumstance at present necessities. During epidemics, as for example the recent outbreak of cholera, the necessity for some place for receiving the dead previous to interment must have pressed itself on everyone who was really conversant with the state of the poor during that terrible visitation. . . . [133] This obvious necessity led to the actual opening of reception house[s in various towns] . . . .

Conclusions

[146] The evidence in the preceding pages leads to the following conclusions:

1. The temporary measures for the removal of the localizing causes of cholera, ordered by the General Board of Health, have . . . been successful precisely in the ratio of the ability and perseverance with which they have been applied. . . . In some cases, they have ensured immunity from attacks. In others, the intensity of the epidemic has been materially diminished. There is no instance of their having been unattended with success, except where they were inefficiently applied or there were local permanent causes of disease which they could not remove.

2. It has been proved that where, from the nature of localizing causes, they did not admit of removal by temporary means, the population

might be carried through the epidemic period with almost perfect immunity by withdrawing them from the affected districts to places of refuge, and bringing them under strict medical inspection.

3. The great majority of cholera attacks have been preceded by premonitory symptoms of longer or shorter duration which, with very few exceptions, might in all probability have been speedily checked by early medical aid. In its fully developed form, the mortality from cholera is not materially lessened by any known mode of treatment, while the whole experience goes to prove that henceforth the measures of medical relief should be directed mainly against the earlier stages of the disease.

4. Without entering into any discussion as to whether or not the diarrhoea which prevails during a cholera epidemic be pathologically of the same identical nature as cholera itself, it is absolutely necessary to consider every case of diarrhoea, especially in localities affected by cholera, as part of the epidemic, exposing the patient to danger if neglected and consequently requiring immediate treatment.

5. It has been proved by melancholy experience that during severe epidemic seizures, persons labouring under premonitory symptoms will not of their own accord apply sufficiently early for medical aid. Therefore, the great proportion of cholera cases are not seen at all till they are in the stage of collapse. To this circumstance is to be attributed the high mortality of the epidemic.

6. Consequently, the main dependence for arresting the ravages of the disease and saving human life must, in future, be placed neither in any specific mode of treatment nor in trusting to the application for relief of the patient or his friends; but chiefly on an active [146/147] and systematic house-to-house visitation by medical officers specifically appointed for the purpose throughout all localities where the disease prevails, [as well as] the treatment on the spot of all persons found labouring under cholera or its premonitory symptoms.

7. There is ample evidence to show that the system of household visitation adopted during the last epidemic has been the means of saving a vast number of lives, both by preventing the development of cholera and by bringing many developed cases of the disease under successful treatment which otherwise would not have been seen until the stage of collapse. It [house-to-house visitation] also led to the discovery and removal of many local causes of disease which would have escaped notice.

8. It is always advisable to treat cholera cases at home instead of removing them to hospital, unless such removal be indispensably necessary.

9. The most severe outbreaks of cholera have been those connected with very obvious local defects requiring the execution of permanent works for their removal.

10. With a few apparently exceptional cases easily accounted for, cholera has invariably localized itself in the bad sanitary districts of towns, while portions in a better sanitary condition have as invariably escaped, either entirely or with occurrence of the milder diarrhoeal forms of the epidemic.

11. The track of cholera and that of fever are identical.

12. Experience has proved the possibility of extirpating fever by permanent sanitary improvements and police regulations. We are warranted by the preceding conclusions in asserting that it is possible by the same measures to prevent localization of cholera.

13. Although a great amount of present benefit has been derived from the preventive measures of the General Board of Health, the most unremitting efforts should for the future be directed to the extirpation of the well-known and obvious localizing causes, not only of cholera but of other epidemics. Henceforth, this object should be perseveringly aimed at as of paramount importance to the health, moral well-being, and pecuniary interests of the country at large.

14. Experience of the late epidemic has proved that this most important public object will be best effected under the watchful superintendence of a vigilant, well-informed, and disinterested authority. . . .

I feel a conviction that those measures which have been successful in the management of cholera are the very measures which, *mutatis mutandis*, will be found most effica-[147/148]cious in coping with typhus, smallpox, scarlet fever, and other forms of epidemic disease which infest large cities. . . . The germs of disease which always exist in an overcrowded population, breathing a vitiated atmosphere and drinking unwholesome water, are permitted to vegetate and produce their natural fruit of widespread pestilence and death before it is in general conceived to be necessary to take any steps for checking the evil. The most complete ignorance in general prevails as to the real condition of the affected localities and the causes from which the calamity has sprung.

No intelligent medical oversight is kept up among the people. The occurrence of epidemics appears to be considered a matter of periodical necessity. Whatever form they assume, the existing law places their management amongst the industrious classes, as well as amongst paupers, in the hands of the parish authorities. A niggardly medical relief is provided, entailing enormous labour on the officers, resulting in many fatal casualties from over fatigue and exposure in the affected districts. Parties are vaccinated for whom application is made. Hospital accommodation is generally afforded. Additional parochial relief for the sick [is] administered where necessary. The dead are buried. In the great majority of instances, these measures, which contain no efficient element of prevention, may be said to

constitute the machinery at present in use for the management of epidemics. It cannot be too often repeated that epidemics ought not occur. Were our cities properly built, drained, cleansed, supplied with water, and otherwise regulated, they would be abolished.

Until these objects can be attained, we must content ourselves with doing all that is within our reach. My own feeling is that the district medical officer should devote his whole time entirely to his special work. In addition to his usual duties, he ought to keep a constant supervision over all those parts of his district which experience has proved to be peculiarly liable to epidemic or other forms of disease. His attention should be directed to ascertaining the causes of this peculiar liability and the steps required for their removal. The very first appearance of an epidemic should lead to the instant adoption of measures of prevention with the view of checking it in its first germs. If cleansing be required, it should be done. If the lime-washing of houses in entire neighbourhoods be necessary, it should at once be undertaken. If unwholesome water be the cause, a better supply should be provided as soon as practicable. If the houses be badly ventilated, every possible amelioration should be adopted. Above all, if neighbourhoods be overcrowded or the disease have appeared in particular houses, the excess of population should be dispersed without delay or removed to temporary places of refuge . . . . The medical officer should be vested with certain legal powers for carrying out his recommendations.

These, in fact, have been the very measures adopted during the late cholera. And it appears to me to be absolutely necessary that some more effectual legislative provision should be made for applying them to future emergencies. The enormous local rates which have been levied to [148/149] meet the expenses of unchecked epidemic disease ought to be a sufficient argument with persons who cannot be influenced by higher considerations, for calling in question the wisdom of the present system of management, and to show that the subject of *prevention* merits a greater degree of consideration than it has received and is far more intimately connected with the vital interests of society than has been hitherto imagined. . . .

London, 24 April 1850 John Sutherland