

from the quantity of filth and other matters which it receives in its course. The disease was most severe in those parts of Merthyr and Dowlais which are built on hill-sides—the law as to the natural unhealthiness of such localities, if unprotected by drainage, holding good in these as in other places. Few localities have suffered more than Dowlais, and it would be difficult to find one in which the sanitary conditions were altogether so bad. The paving was defective, no drainage, no water-supply, no household conveniences, no cleansing, and the atmosphere always in a comparatively impure state from the proximity of iron-furnaces. In addition to these predisposing causes, the houses were totally unventilated. Indeed, I do not remember to have seen a single window that would open at top.

**TAIBACH.**—This village is situated on a flat close to the sea-shore. There are extensive salt-marshes in the neighbourhood. The locality is damp and undrained, and the houses in some instances overcrowded. The ventilation has been obstructed by a railway embankment running through the town. I consider the natural defects in the position of this place and the habits of the population as having predisposed them to the disease.

**ROMSEY.**—Is built on flat land, permeated by water. It is traversed in all directions by watercourses, some of which run beneath the surface. It is undrained. The first attack of cholera took place in a very small detached house in a densely-peopled neighbourhood. On two of the sides of this house, and close to the foundations, there were two large cesspools filled with offensive matter. The houses in the immediate neighbourhood also suffered. They were remarkably small, without ventilation, and the population overcrowded.

**PLYMOUTH.**—An outbreak of cholera took place on board an American emigrant ship (the "American Eagle") which put into this port, after having lost a number of the passengers and crew. The chief circumstances of a local nature which appear to have determined the epidemic seizure were overcrowding and defective ventilation. The sufferers were all either steerage passengers or sailors, who slept in a very close crowded fore-castle. In neither case were the means of ventilation at all adequate. The cabin passengers, whose quarters were clean, open, airy, and thoroughly ventilated, and where every inmate had sufficient cubic space, escaped entirely. There was not even a case of diarrhœa among the cabin passengers, while those in the steerage suffered very much both from diarrhœa and cholera.

**LONDON.**—Previous to the introduction of the preventive measures into the metropolis, I was directed by the General Board of Health to inspect the districts most affected by the epidemic. The experience derived was most instructive, as it proved to 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 inhabited by the lower classes, but in some parts of 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, and these are inefficient drainage, cesspools under or close to the houses, a subsoil saturated with organic matter, and not

unfrequently 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 diarrhœal 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 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 which 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, and 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.

## SECTION II.

### MANAGEMENT OF CHOLERA THROUGH ITS LOCALIZING CAUSES.

ON this subject there is evidence to show—

1st. That it is possible to prevent the localization of the epidemic, by removing the obvious topical causes which precede and accompany its attacks.

2nd. That, if from their magnitude or nature it be impossible to abate these causes, the same object may be attained by the removal and dispersion of the people.

I shall consider these in succession.

1. *Localizing causes removable.*—Had the warning voice of the former epidemic been heeded, and had proper steps been taken to remove those local conditions which all experience had shown to be

the concomitants of outbursts of cholera, it is possible that the epidemic influence might have been attended with results scarcely more fatal than those of the milder diarrhoeal stages. No sooner, however, had the disease disappeared than the mere temporary efforts at amelioration, which had been made during its presence, were suspended. No sanitary works of a permanent nature were undertaken; an increasing population was allowed to accumulate in all our towns, while no additional measures were adopted for protecting them against those dangers which always accompany overcrowding. All the former evils resulting from bad drainage and water-supply, defective paving, want of ventilation, and want of cleansing, were left untouched; and when cholera again appeared, it went to its old haunts, located itself in the same filthy streets, courts, and alleys; it harboured in the same houses, and sometimes carried off its victims from the same bed. In every district which it attacked its ravages were most fatal where the sanitary conditions were the worst. It took a smaller number from amongst those who lived in healthier localities; and, as a general rule, it may be stated that those parts of our cities and towns which careful observation would pronounce as likely to be the most healthy, escaped almost entirely.

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 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 to 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 similar 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; and it was generally thought to be sufficient to begin the cleansing of bad districts of towns when the disease was in the immediate neighbourhood. I have no doubt that beneficial results arose even from these very imperfect measures; but that they were by no means what might have been attained, is sufficiently proved by the experience of towns where a more enlightened and intelligent management was pursued.

The remarkable effects produced by the lime-washing of houses and entire neighbourhoods is certainly an exception to the 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 the nurseries of fever and cholera; and during

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, the favouring conditions of both types of disease having 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.

The ordinary fever districts have escaped cholera after being lime-washed, and yet, as is well known, they are the usual habitats of the latter epidemic. Many illustrations of this fact could be adduced; but one, taken from the Report of Dr. James Maxwell Adams, on the Thirteenth Medical District of the city parish, Glasgow, will suffice:—

“At No. 15, College-street, there is a back tenement of five flats, having a building of equal height in front, and at a distance of about nine feet. A considerable part of the ground-flat of this back tenement forms a common dungstead; and it is built up at the back by another tenement of equal height, which contains nearly the same number of houses and of inhabitants, who are of the same class in both. The building in 15, College-street, is as unfavourably situated in regard to light and ventilation as can well be imagined; the two tenements have hitherto been nurseries of disease. During the last six months of 1847, almost every house had two or more cases of typhus. I anticipated, therefore, a considerable amount of disease; and from the onset of the recent cholera epidemic I directed special attention to the buildings, and caused a house-to-house visitation to be made once or twice daily. From first to last there occurred in 15, College-street, only two cases of choleraic disease; while in the other tenement there occurred fifteen cases, of which three proved fatal. It may be difficult to account for this unusual contrast, unless from the circumstance that the relative condition of the two tenements became altered. A few months prior to the commencement of the epidemic, No. 15, College-street, passed into the hands of a factor, who caused all the houses and lobbies of the tenement to be whitewashed thoroughly several times, and by constant inspection enforced habits of cleanliness on the tenants. In the other tenement which suffered, matters remained in their usual dirty condition.”

Similar facts will be found in subsequent parts of this Report.

I would refer to the Report on Sheffield, given elsewhere, as affording a very good illustration of the beneficial results produced by the intelligent and persevering use of preventive measures for a period long anterior to the invasion of the epidemic. Such cases, I am sorry to say, have not been numerous; but it is satisfactory to know that there is not an instance of the failure of similar measures in protecting the population, wherever they were applicable and zealously carried out.

A consideration of the more prominent causes of epidemic outbreaks will show that the most powerful of them do not admit of removal by mere temporary means. Dampness and defective drainage can only be remedied by extensive permanent works, and a power to compel ventilation in houses and to prevent overcrowding is still a desideratum.

Again, 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-

gence and the spirit of enterprise among that class of builders who provide houses for the labouring classes.

The great lesson taught by the late epidemic is, that in future we must proceed to deal vigorously with these standing causes of disease and pauperism, if we are really in earnest to rescue our population from the ravages of fever and cholera.

2. *The Removal of the People.*—The only escape from the fatal effects of permanent causes of disease, which cannot at once be removed, is to be found in the second of the methods indicated above, to wit, 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 late 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; so that between 30 and 40 per cent. 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. By referring to the examples of these outbursts already given, it will be found that no fewer than 87 per cent. of the cases and 61 per cent. of the deaths took place in houses where more than one person had suffered from cholera. Even in these instances, however, the danger does not in general continue long. If the people be removed and kept away for a week or ten days, and if their houses be limewashed during their absence, they may return home with comparative safety; while the whole number of attacks and deaths of persons removed to the Houses of Refuge is very much below what it would have been had they remained at home. The following table will show the results of this preventive measure:—

STATISTICS OF HOUSES OF REFUGE.

Houses of Refuge.	No. of Inmates admitted from affected Houses.	Total Cases of Cholera in the Refuge.	Deaths.
Edinburgh, City parish . . . . .	270	..	..
City parish, Glasgow . . . . .	401	19	5*
Barony parish, Glasgow . . . . .	406	6	3
Sheffield . . . . .	145	4	2
Bristol . . . . .	210	..	..
Dundee . . . . .	259	4	..
Total . . . . .	1691	33	10

\* The large proportion of attacks and deaths in the refuges in Glasgow may be accounted for by the fact of their having been placed in localities affected by cholera.

The very small proportion of attacks and deaths which this table shows 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 as all the inmates were inspected by the medical officer twice, or oftener, during the day, very few even of these severe cases passed into cholera. The mortality from the epidemic has varied from 1 per cent. to 3, 4, and even 7 per cent. on the entire population of towns. These proportions include not only those in localities more immediately affected, but the unaffected population also. *The parties removed to houses of refuge were all taken, as has been stated, from infected houses or localities, and yet the table exhibits a proportion of deaths to the inmates of less than 0.6 per cent.* It was observed that the general health of the people was materially improved during their stay in the Refuge, in some degree, no doubt, from the better diet provided for them, but mainly, I conceive, from their having been withdrawn from infected localities.

It is very much to be regretted that this system was so inefficiently carried out in many of the affected parishes. I found almost everywhere a want of intelligence in appreciating its importance; and I hardly know an instance, except in a few of the Scotch towns, in which a House of Refuge was prepared before the disease made its appearance. Even after hundreds of persons had died, I have occasionally experienced great difficulty in inducing Boards of Guardians to provide the needful accommodation. This has arisen partly from the obstacles which popular prejudice has thrown in the way of obtaining suitable premises—one of the necessary fruits of the doctrine of contagion—and partly from the fear that pauperism might be increased. The marked beneficial results which have been observed wherever a House of Refuge has been properly worked, warrant me in stating that a great many lives have been sacrificed all over the country from want of attention to the orders and notifications of the General Board of Health in regard to this matter.

## SECTION III.

## MANAGEMENT OF CHOLERA THROUGH ITS PREMONITORY STAGE.

1. *The 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 days to a