

Report of the General Board of Health on the administration of the Public Health Act and the Nuisances Removal and Diseases Prevention Acts from 1846 to 1854.

Contributors

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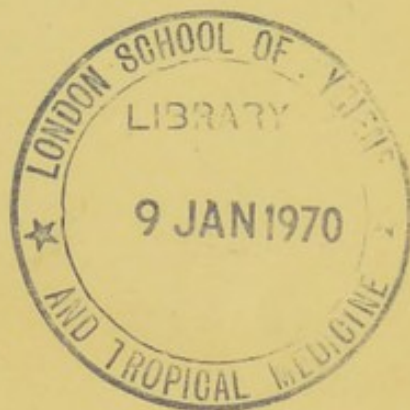
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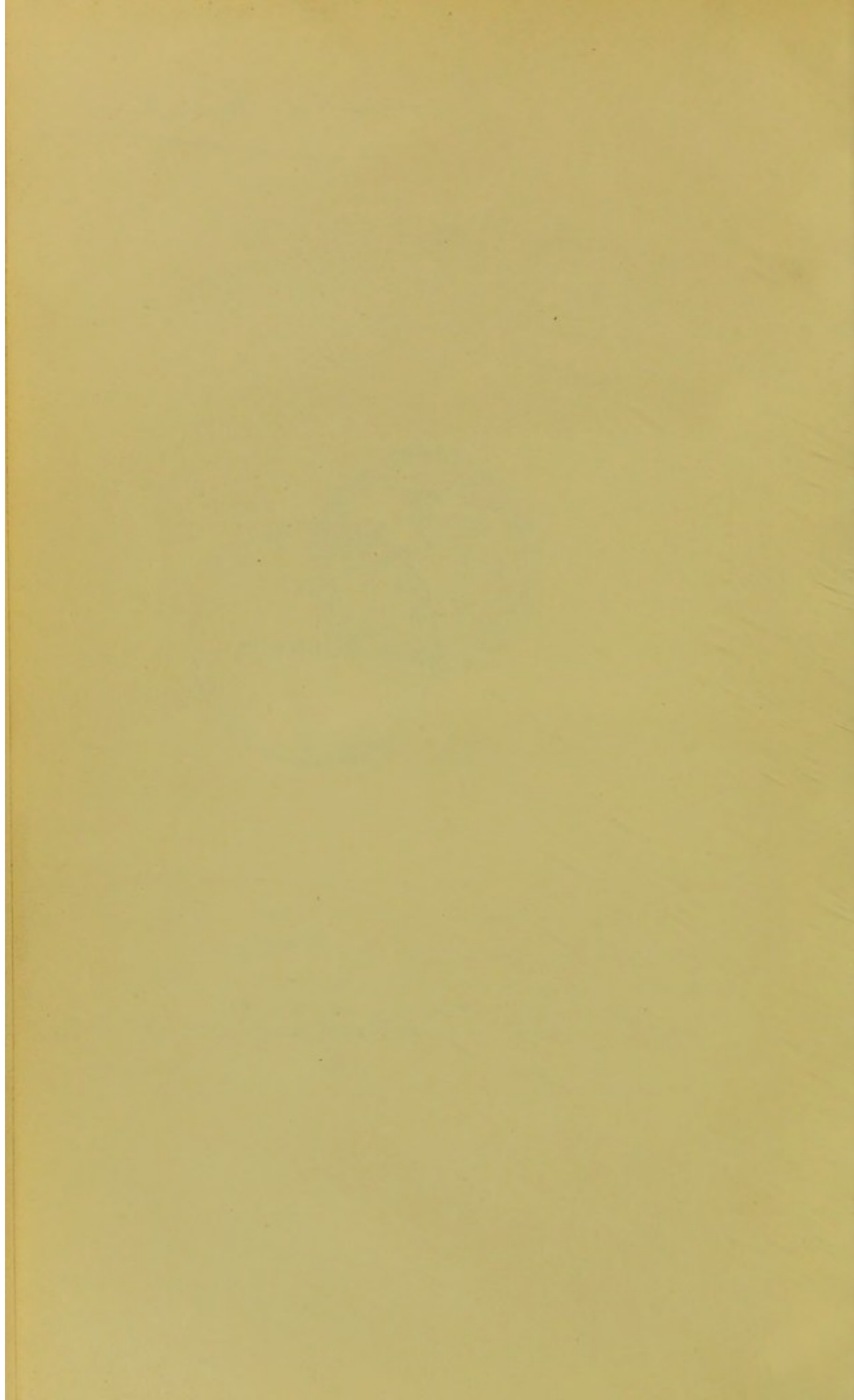


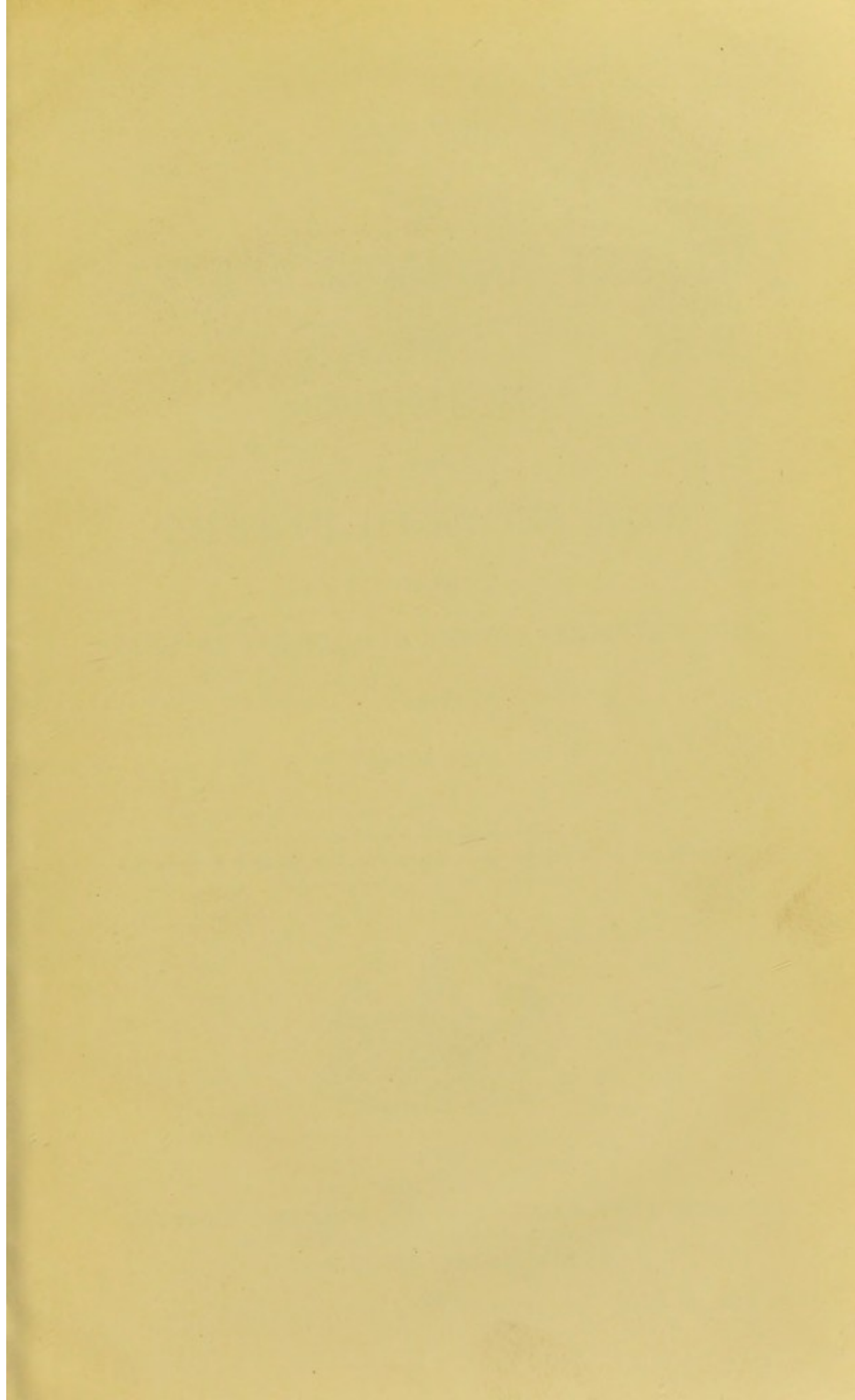
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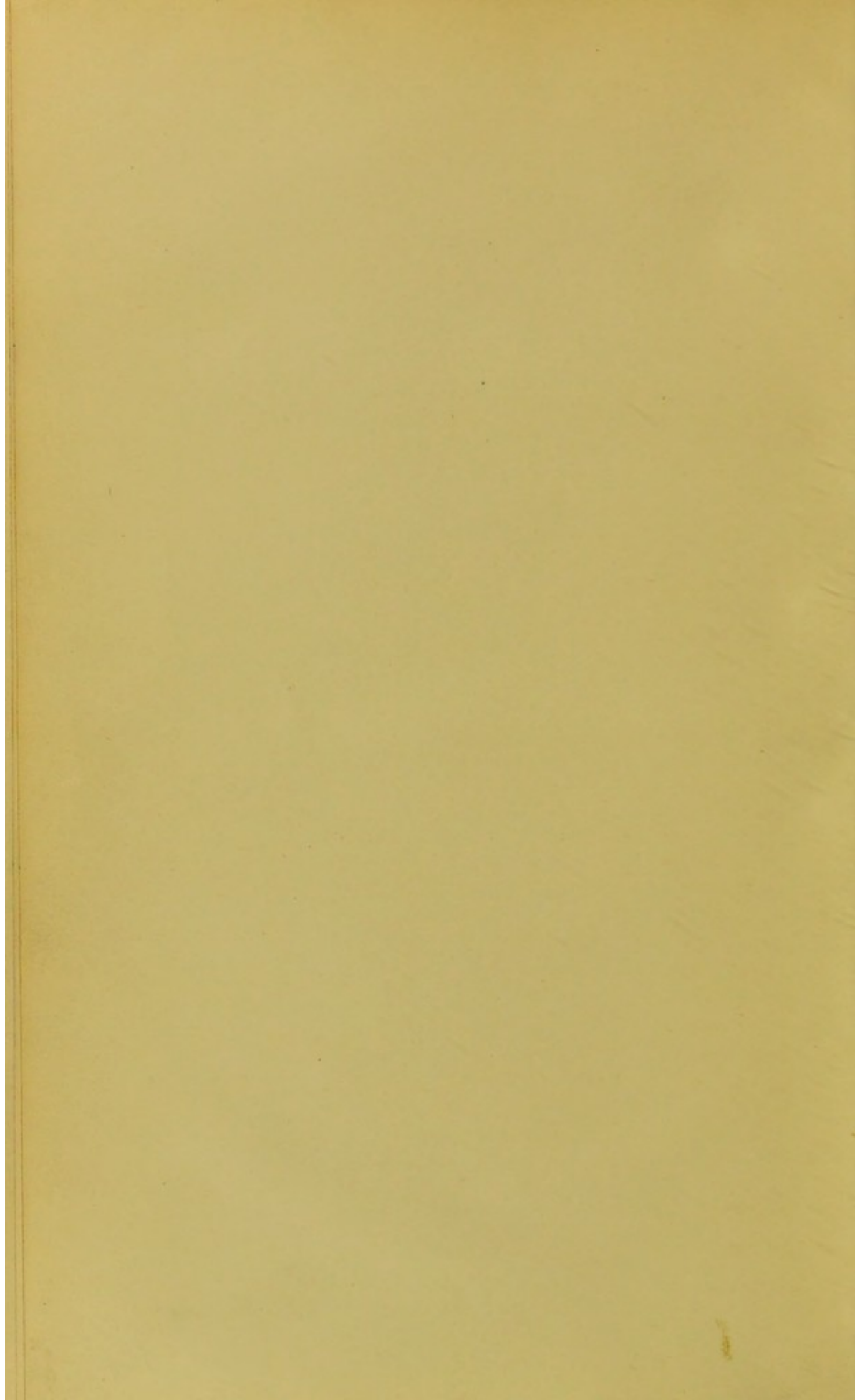
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James M. Mackintosh









REPORT
OF THE
GENERAL BOARD OF HEALTH
ON THE
ADMINISTRATION
OF THE
PUBLIC HEALTH ACT
AND THE
NUISANCES REMOVAL AND DISEASES PREVENTION ACTS,
FROM
1848 to 1854.

Presented to both Houses of Parliament by Command of Her Majesty.



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General Board of Health,
Whitehall, 6th January 1854.

MY LORD,

The term for which we were appointed to administer the Public Health Act now drawing to a close, we beg leave to present, for the information of your Lordship, the following statement of the progress made in the execution of that Act, and of the present state of the business of this Board.

Though the administration of the Public Health Act formed our special and paramount duty, we have been required under the Nuisances Removal and Diseases Prevention Act to devote much attention to several objects of immediate and great urgency, of which it may be proper first to give a brief account.

Shortly after entering on our office the calamity of a second outbreak of pestilential cholera appeared to be impending, and the threatened danger was soon realized.

This pestilence has again, for a third time, appeared, and the part we have been called upon to take with reference to both of these epidemic visitations will, we apprehend, when duly examined, afford means of judging of the public demands for administrative service, such as that which has devolved upon us.

Returns from the registration districts of England and Wales, show that, on the last visitation of 1848 and 1849, about 72,000 persons fell victims to cholera and choleraic disease during the epidemic.

It is known that these returns were not accurate, as also that many deaths occurred which were not registered. In several instances information as to partial outbreaks was suppressed, and there is reason to believe that in many towns, in ill-drained and neglected districts, occupied by the poorer classes, numerous deaths really produced by epidemic cholera, were either not known to have been so caused, or were registered as caused by other diseases.

In Scotland there are no registration returns, but the mortality from the pestilence in that part of the kingdom is believed to have been greater in proportion to the population than in England.

It is probable that not fewer than between 80,000 and 90,000 persons in the whole of Great Britain perished by

To the Right Honourable
Viscount Palmerston, G.C.B., M.P.,
&c. &c. &c.

this disease, and, reckoning three attacks to one death, that upwards of a quarter of million were the subjects of the disease in its developed form. It is estimated that of those who died in England and Wales, 30,000 were adult persons of both sexes in the vigour of life.

In the last twenty-two years' war the number of British who were killed in actual battle, including those who fell both in the army and navy, was under 20,000 (19,796), so that there perished in a few months by this one epidemic 10,000 more persons in the prime of life than fell in battle during the whole of the last war.—(See App. No. 14.)

In Newcastle and Gateshead, during the recent outbreak, the mortality has been nearly three times greater than it was in the metropolis in the epidemic of 1848-9, and during the last four months,* even in the metropolis, the deaths from cholera have nearly doubled the number registered in the corresponding period of 1848.

If the pestilence in 1854 spread through the country as it did in 1849, and prove as mortal in its entire course as it has done at its recommencement, there will have perished by the end of next year upwards of 100,000 persons, including in this destruction probably as large a number of the young and able-bodied as have been enrolled in the militia. At the cessation of the epidemic of 1849, the loss of life was as if an entire county, like Cardigan or Huntingdon, had been deprived of the whole of its population. At the termination of the impending visitation the loss may be equal to that of the depopulation of two such counties.

In twelve unions in England in which that epidemic caused 11,170 deaths, returns show that there were 3,567 widows and orphans. The charge upon the rates for the maintenance of persons thus pauperised, for four years only, would probably amount to about 121,000*l*.

At the same rate, the 72,000 deaths in England and Wales would give 23,000 widows and orphans of the class chargeable to the poor rates, and involve for their relief an expenditure of 780,000*l*. for the like period of time. If

* In the period (from January to March) which has elapsed since the presentation of this report, there has been a more decided lull in the progress of the epidemic than occurred in 1848-9, so that at the present period the deaths are somewhat less than in the corresponding period of 1848. In the first six months of the epidemic of 1848 the deaths in the metropolis amounted to 988 ; in the corresponding period of the epidemic of 1853 they number 802.

to these sums be added the expense of funerals, of medical attendance, and of relief to those who were attacked but recovered, and if Scotland be included, the pecuniary cost of this visitation, (exclusive of the cost to Ireland,) could not have been less than 2,000,000*l*.

Under the Nuisances Removal and Diseases Prevention Act we were charged with the duty of devising and administering measures for mitigating and checking the spread of cholera.

An examination of the results of the preventive measures which were adopted will show that they exercised a very decided influence in checking the progress of the pestilence.

In other countries where no such measures were resorted to, and where the predisposing and aggravating local conditions could hardly have been more intense than in the neglected districts of many of our own towns, the mortality in proportion to the population was, in several instances, much more than double that of Newcastle, the only town in England in which the disease has, in 1853, been epidemic. In Stockholm, for example, the deaths in round numbers were 31 in 1,000 of the population. In Copenhagen they were also 31 in 1,000. In Warsaw they were 35 in 1,000; and in Christiana they were also 35 in 1,000. But in Newcastle, during the recent outbreak, although this has been the severest that has yet occurred in this country, they were 17 in the 1,000.

If the mortality in England and Wales, from cholera, in 1849, had been at the average rate of that which has lately occurred in the places above enumerated, the deaths instead of being 72,000 would have been near 600,000.

That the visitation of 1848-9 was greatly mitigated by the preventive measures that were adopted, will be evident on a consideration of the results set forth in our report on cholera (pp. 143 to 149), and these results, as will be seen below, are confirmed by the recent experience of Newcastle and other northern towns (App. 1, p. 64).

The demands made upon us for assistance on the first outbreak of the epidemic in 1848, rendered it urgently necessary that we should apply ourselves to the subject. Inquiries under the Metropolitan Sanitary Commission appeared to us to have ascertained facts which determined the proper mode of dealing with the pestilence. These investigations, exhibiting the course of the disease in previous **attacks**, and the results of the experience of medical

witnesses who attended the greatest numbers of the sick, in the districts most severely ravaged, had proved, beyond all question, that in the immense majority of cases the violent and unmanageable form of cholera is not sudden in its approach, but is preceded by a premonitory stage, generally of some hours and often of several days' duration, and that in this stage the disease is controllable. On the other hand, from the experience we had collected from countries and climates the most diversified, it appeared that if this stage be neglected, and the developed stage allowed to come on, one half, or even two thirds, under unfavourable, and one-third under the most favourable circumstances, of those attacked, are certain to perish, whatever may be the mode of treatment adopted.

On these facts we endeavoured to base a system of prevention. In order to discover the disease in its earliest stage, and to bring it immediately under proper treatment, we organized a system of house-to-house visitation, so as to place the inmates of every poor man's house in infected districts under daily medical inspection.

We moreover proposed the opening of dispensaries, at which, in the absence of the visitors, the poor might be provided with medicines at any hour, night and day; and also the opening of houses of refuge for the temporary reception of the inmates of filthy over-crowded houses, in which cholera had either actually broken out or was impending; and we further advised that the medical visitors should be made instrumental in discovering and reporting nuisances, and pointing out the houses and localities which stood in the most urgent need of cleansing.

At first much difficulty was experienced in bringing these combined measures into operation, but as the epidemic advanced the system was extensively adopted, and in many instances energetically and efficiently applied.

The following is a summary of the results:—130,000 persons in the first stage of cholera were by its means discovered and placed under immediate treatment. Of this number 6,000 were on the point of passing into developed cholera, yet only 250 or about 1 in 500 actually did so. Of the whole number brought under visitation in the metropolis (43,737) 978 were on the point of passing into cholera, but only 52 actually did so; so that, on the whole, the numbers which passed from the premonitory into the developed state ranged from one in 500 to one in 800.

In the much severer visitation which has recently taken

place at Newcastle the results are similar. The returns show that during this outbreak 44,611 persons, suffering from diarrhœa and cholera, received relief under this preventive system, but it must be borne in mind that many persons were relieved more than once, so that some deduction from the above number must be made.

The total number of persons discovered in Newcastle, by the house-to-house visitation, in a state of cholera or choleraic disease was 5,497. Of these there were in diarrhœa 5,160; approaching cholera, 271; cholera, 66. The visitors also discovered the corpses of three persons who had died without receiving any medical aid.

Of the 5,160 cases thus discovered in the first stage, 17 passed into the second stage; and of the 271 in the second, 13 passed into the third stage, or into developed cholera; that is, about one in 300 passed from diarrhœa into approaching cholera, and nearly five in 100, or one in twenty, passed from approaching cholera into cholera.

These results mark the greater severity of the outbreak at Newcastle than that in the metropolis in 1849, where, as has just been stated, only one in 800 of the cases of diarrhœa passed into cholera. It is remarkable, however, that in the stage approaching cholera the proportion that went into cholera was nearly the same in both epidemics, this event happening in 1848 in one case in nineteen, and at Newcastle in one case in twenty.

The influence of the house-to-house visitation in checking the progress of the pestilence at Newcastle is shown by the following facts:

On the first week in which the visitation came into complete operation, there were under the care of the medical officers 333 cases of cholera, and 321 of approaching cholera.

In the second week these fell to 76 cases of cholera, and 132 of approaching cholera.

In the third week only 6 cases of cholera and 48 of approaching cholera could be discovered.

In the next three weeks the visitors found but 5 cases of cholera, and 51 of approaching cholera, and the total number of cases treated by the medical officers amounted only to 47 cases of cholera and 86 of approaching cholera.

The medical inspector reports, "These were, for the most part, isolated and scattered cases; in the infected districts the disease was as effectually extinguished as a fire would be by a sufficient water fall."

It is important to bear in mind, as showing that this sudden and rapid diminution of cases was owing in a very great degree to the preventive measures enforced, and only in a subordinate degree to the natural decline of the disease, that, while cholera and approaching cholera fell from 333 to 76 and from 499 to 180, diarrhœa still prevailed, according to the testimony of all the medical men engaged in this service, in as severe a form as before, and in the proportion of 3,398 to 2,327, exclusive of the cases which received aid at the newly opened dispensaries. The diminution was in fact nearly 77 per cent. in the cholera cases; 64 per cent. in the cases approaching cholera; and only 31 per cent. in the diarrhœa cases.

In the town of Stockton-upon-Tees a violent outbreak of cholera occurred between the 5th and 7th of October. The house-to-house visitation began on the 7th and ended on the 20th. During this period there were discovered 503 cases of diarrhœa, 16 approaching cholera, and 11 cholera. Of this total number only 11 ended in death; the whole of the cases of diarrhœa, together with those of approaching cholera, having been stopped from advancing to the developed stage of the disease.

We believe the difference in the proportionate mortality in the towns in which this system was carried into effect, compared with that in towns where no such measures were adopted, whether in this country or abroad, affords a measure of the amount of life which this system was the means of saving.

It may be further stated, that one invariable effect of the system, wherever brought into operation, was to put an end to panic. The people finding they were cared for, and knowing definitely where and how to apply for assistance in the moment of need, became tranquil, and confidence was restored.

Medical officers generally both at home and abroad have expressed their conviction of the efficiency of this system of prevention.

The College of Physicians have concurred in recommending its adoption.

Local authorities, instead of resisting its application as they did in 1848, have recently, in numerous instances, applied for advice and assistance in preparing for its organization. The orders of the Board are more closely and generally executed. The complaints commonly re-

ceived now are of the insufficiency of the powers conferred for accomplishing the objects of the Legislature. From Scotland we have received applications to order works of a permanent nature. Petitions for the application of the Public Health Act have increased. The medical inspectors state that they find a marked change in the towns they visit, compared with the feeling which was very general in 1848 ; that the local authorities are now anxious to give efficient action to the orders and regulations of the Board, and that they themselves universally receive votes of thanks and urgent requests to repeat their visits.

The Poor Law Boards of Guardians, the Inspectors of the Poor Law Board, the Union medical officers, the Local Boards of Health, and the Boards' medical inspectors are now brought into a far better state of union than in 1848, and join in willing and cordial co-operation.

The officers under the Board of Customs and the Board of Trade, the officers under the Emigration Commissioners, and the medical staff of the Admiralty will, we have reason to believe, be better prepared than in the last epidemic to give aid on a recurrence of outbreaks in the ports.

The Ordnance will, we expect, be ready again to aid with the use of tents, should outbreaks occur at the season of the year when tents can be used, to tent out the population from the infected districts,—a practice which has been found of signal advantage.

Recent experience has strengthened our conviction that the service rendered on the occasion of these local outbreaks, to be at all effectual must be immediate. In ordinary civil service, the delays occasioned by multiplied references and the fulfilment of routine forms, may do little harm, and are borne patiently ; but in the case of the application of measures for the repression of epidemic disease, all delay involves the extension of sickness, and the infliction of pain, misery, and preventible death ; and therefore when plainly attributable to any public department, tends to make public administration odious to the people.

It was during our direction of preventive measures against the spread of cholera, that our attention was called to the fatal consequences resulting from the isolation of cholera patients, in an infected atmosphere on board ship, under quarantine regulations, and to the total inefficiency of quarantine as a safeguard against this disease.

We deemed it our duty to investigate the subject as closely and extensively as we could, and we embodied the conclusions at which we arrived in a Report on Quarantine, which, having been translated into Italian and French, and widely circulated on the continent, mainly contributed to the conference held at Paris, with a view to the reconstruction and reform of the existing system of quarantine.—(App. No. 3, p. 69.)

Having, under the authority of the Nuisances Removal and Diseases Prevention Act and by direction of Her Majesty's Government, been required to frame a scheme of Extramural Interment for the metropolis, we carefully investigated all we could find to have been done abroad with respect to the economical and respectful performance of this service. While we kept in view the importance of the essential object, that of putting an end to the physical and moral evils resulting from the practice of burying the dead in the midst of the living, we could not treat the disposal of the last remains of the dead as if they were a mere nuisance to be got rid of in any way. We regarded the service, on moral and religious, as well as physical, grounds, as a service to be elevated. We objected to depriving the parishioner of his right to interment in the parochial burial ground, without providing for him an equivalent under public sanction, or to leaving his necessities to the mercy of trading speculation. We also objected to enforcing this great and necessary reform without making provision for compensation to those who might appear to have a just claim to it, as suffering grievous and irrevocable loss from the change. We endeavoured to secure the removal of the dead in such a manner as should be soothing to the friends and relations of the deceased, without being offensive to strangers, or the general inhabitants by the conveyance of the remains in excessive numbers through crowded thoroughfares. To abate the evil of retaining the dead body in the living and sleeping rooms of the survivors, we planned reception rooms on what we believed to be a new, appropriate, and efficient construction. We believed we had provided against the extension of the old evils to new suburbs. We still believe that these objects might be secured without levying rates, with full compensation where compensation is due, and with a reduction of one half of the existing expense of funerals. Though the scheme presented was accepted by Her Majesty's Government, and its main principles sanctioned by the Legislature, yet the powers required for carrying it into

effect were not granted by Parliament; we were, therefore, unable to render it available for putting an end, so completely as we believed from the facts investigated to be practicable, to the great and growing evils of intramural interment. While we are confirmed in our views by the subsequent general representations of the great body of the clergy, founded on the continued experience of evils which it has been the object of the Legislature to remove, we have, on application from the Home Department, given, as it was our duty to do, every advice and aid in our power for the due execution of the existing law.

Apart, however, from the questions as to the particular measures which the evidence rendered it our duty to recommend, we believe that compensation will be received for the time occupied, from the principles elicited or confirmed for the improved management of places of public interment, which will be available for the guidance of local authorities, as well as of those of our inspectors who have been engaged in the execution of the existing law.

We were further requested by the Secretary of State for the Home Department, to investigate and report on the whole subject of a more efficient and economical supply of water for the metropolis. In compliance with this direction, we endeavoured to devise a scheme which might supply the metropolis with pure, soft, spring water, instead of hard, polluted, river water; by constant instead of intermittent service, combined with works for carrying away waste water, and this at so reduced a cost that every house in the poorer districts might have its supply of water at a price not exceeding two pence per week. This has been effected for several towns, under the Public Health Act, and may be ultimately effected for all towns under that Act. We expressed our conviction, which we still retain, that there are no insuperable difficulties in the way of accomplishing the same results for the metropolis.—(*See Reports and Minutes on new Sources of Water for the Metropolis, and new Modes for its Collection.*—Also, App. No. 5 and No. 6.)

But for these extraordinary demands on our time and attention, we might now have had the satisfaction of reporting a greater number of towns in the enjoyment of the powers and privileges of the Public Health Act, and these in a state of greater forwardness with their works; yet, considering that the labour in which we have been

engaged is the first attempt to carry into practice a principle of legislation entirely novel, and that the staff of superintending inspectors to conduct the preliminary inquiries has never exceeded seven, and during the greater part of the time has been limited to five, we submit that as great a degree of progress has been made in the application of the Act as could have been reasonably anticipated.

We have now to state that 284 towns have memorialized and petitioned in form for the application of the Act. Of these, up to the 31st December 1853, the requisite forms and proceedings prescribed by the Act, have been complied with in 182, including nine in which the Act has been incorporated with local Acts, comprising altogether a total population, according to the census of 1851, of upwards of two millions—(2,100,000).

Within the last three months we have had petitions for the application of the Act from upwards of twenty towns.

Though, in many of the 182 towns, the application of the Act has been comparatively recent, yet, in one hundred and twenty-six cases, surveys with a view of carrying the Act into operation, have been completed or are in progress.

In seventy, plans of new works founded on the surveys have been laid out.

In thirty-one, including the cities of Gloucester, Salisbury, and Ely, and the towns of Dover, Preston, Lancaster, Penzance, Wigan, and Chelmsford, plans of combined works for water supply and drainage have been submitted to the Board for examination, and have been approved; mortgages of rates for the execution of these works have been sanctioned to the amount of upwards of 467,000*l.*, and the works are now, for the most part, in progress.

Besides the above sum for works entirely new, plans have been examined by the Board's inspectors for works of drainage to combine with waterworks already existing; for the extension of waterworks, and for other improvements contemplated by the Act, such as the paving and widening of streets, the opening of thoroughfares, the removal of obstructions to ventilation, &c. Plans, having reference to works of this description, have been examined and approved for thirty-nine towns; and sanctions for the execution of these plans have been given to the amount of 589,000*l.*, making a total sum, for which mortgages of rates have been sanctioned, of upwards of one million, viz. 1,056,000*l.*

In thirteen towns, including Rugby, Tottenham, Alnwick, Morpeth, Hitchin, Ormskirk, Barnard Castle, St. Thomas, Exeter, Ottery St. Mary, Ashby-de-la-Zouch, and Launceston, the whole of the public works for water supply and drainage are completed, and reported to be in full action; while the private portion, or that which connects the house drainage and water supply with the public works, is in rapid course of execution. With one exception (that of Croydon, to which we shall subsequently advert), these works are reported to be working satisfactorily:—that is to say, the main drainage works and the house drainage works, as far as they have been properly executed, are completely self-cleansing.

It is expected that in about thirty-five other towns combined public works will be completed, and in full action, in less than a year.

There will be further required an examination of surveys for fifty-seven towns, and of plans of works for one hundred and twelve towns.

Supposing the cost of the execution of such plans, after examination and approval, to be at the same rate as the cost for similar works in the thirty-one towns for which sanctions have already been given, according to the closest proximate estimate that can be formed, there will be required for the public works in these towns 3,643,156*l.*, and for their private works, at least 1,190,826*l.*, making altogether a total sum of 4,833,980*l.* The rise in the price of labour and materials since those sanctions were given, will, however, if they should continue at the present rates, augment the total expenditure to upwards of 6,000,000*l.*

This estimate has respect only to the sum which will probably be required for town and house drainage, and water supply; being, for water supply brought to every house, an average of a penny halfpenny ($1\frac{1}{2}d$) a house per week, and for main drainage or sewer drainage brought to the house, of 1*d.* per house per week. The average expense at which the works within the houses of the poorer classes have been executed under private improvement rates, for introducing a service pipe, putting down a sink, filling up the cesspool, and substituting a water-closet and self-cleansing house drains, and the construction of a dust bin, has been 1*d.* per week, being a total average cost of one halfpenny a day.

This amount does not include what may ultimately be found needful for collateral improvements, such as those already adverted to,—the formation of public walks, the

opening of spaces for light and air, and the widening of thoroughfares.

One of the most important practical results of the Act has been, the facility which it has afforded for its general adoption by the diminution of expense, in relation both to its application and to works executed under it.

The great diminution of expense in the application of the Act, has arisen from the improvements included in its form of procedure. The diminution of the expense of works has been effected by a closer examination of their nature, and by the appointment of a class of engineering inspectors, who having devoted exclusive attention to this description of works, have made themselves acquainted with their specialties, and have learned the most efficient and economical modes of executing them.

The Commissioners of Inquiry into the means of improving the Health of Towns, report that out of fifty towns that came under their notice, "in scarcely one could the drainage be pronounced good; whilst in seven it was indifferent, and in forty-two decidedly bad, particularly as regards the districts inhabited by the poorer classes."

With reference to works of sewage and drainage, they say "that enormous sums have been spent under legislative sanction for works which produced little or no equivalent benefit; that rate payers have been burthened with rates for works which positively aggravated the evils intended to be remedied, and that the expense and failure of such works form the main source of distrust and opposition to new works under ordinary local or representative responsibility."

With reference to works for the supply of water, they say "that out of fifty towns, in only six instances could the arrangements and supplies be deemed in any comprehensive sense good, while in thirteen they appear to be indifferent; in thirty-one so deficient as to be pronounced bad, and so far as yet examined frequently inferior in purity."

Yet, for works thus indifferent and inadequate, enormous compensations are often demanded, as a condition of allowing complete works under the Public Health Act to proceed, and of permitting the inhabitants to avail themselves of more wholesome and abundant supplies of water. Parliamentary sanction is commonly presented as the basis of the claims for compensation for such works, it being assumed that the preliminary examination of the plans by

committees was full and complete, and the sanction given to them given deliberately, so as to constitute a public responsibility for the private enterprise.

Moreover, amongst the outlays for such works treated as necessary investments of capital, are found heavy charges for obtaining the requisite powers, whether by private or by local Acts, amounting to sums which, properly applied, would have sufficed for the construction of a large proportion of the works required for the permanent improvement of the worst districts. In some instances, one-third of the permanent rates are required to defray legal and parliamentary expenses.

The works for the drainage of towns, were thus described in the first sanitary report:—

“ The local reports abound with instances of expensive
“ main drains, which, from ignorant construction as to the
“ levels, do not perform their office, and do accumulate
“ pestilential refuse ; others which have proper levels, but
“ from the want of proper supplies of water do not act ;
“ others which act only partially or by surface drainage,
“ in consequence of the neglect of communication from
“ the houses, but where the house drains do not act, or
“ only act in spreading the surface of the matter from
“ cesspools, and increasing the fœtid exhalations there-
“ from, in consequence of the want of supplies of water ;
“ others, again, as in some of the best quarters of the
“ metropolis, where the supplies of water are adequate,
“ and where the drains act in the removal of refuse from
“ the house, but where, from want of moderate scientific
“ knowledge or care in their construction, each drain acts
“ like the neck of a large retort, and serves to introduce
“ into the houses the subtle gas which spreads disease from
“ the accumulation in the sewers.”

These defects were particularized in the first Report of the Commissioners for Inquiry into the means of improving the Health of Towns.

“ Evidence,” say the Commissioners, “ has been pro-
“ duced before us, demonstrating that drains, when in
“ other respects properly constructed, would confer little
“ comparative benefit if no provision be made for the
“ introduction of supplies of water sufficient to cleanse
“ them. Instances are adduced where such drains have
“ only extended existing evils.

“ In districts in which both house and main drains exist,

“ or are in course of extension on an imperfect system, we
“ have received strong evidence, showing that as these
“ sewers and drains are so formed as to allow decom-
“ posing refuse to accumulate, and to permit the escape
“ of emanations into the street or houses, the inhabi-
“ tants do not derive a benefit in proportion to the expense
“ incurred.

The Commissioners then adduce the evidence of archi-
tects and builders “ to show the evil effects that will ensue,
“ unless the connexion of the internal works for a complete
“ house drainage, and the works of external main drainage
“ be made necessary and component parts of an efficient
measure.

“ The medical witnesses have brought before us facts in
“ support of their strongly urged and unanimous opinion
“ that no population can be healthy which live amid cess-
“ pools, or upon a soil permeated by decomposing animal
“ or vegetable refuse, giving off impurities to the air in
“ houses and streets.

“ They state the necessity of preventing all accumu-
“ lations of stagnant refuse in or near houses, and of sub-
“ stituting a system of house drainage and cleansing, aided
“ by the introduction of better supplies of water into the
“ houses. They have brought forward instances where the
“ main drains and sewers were tolerably well formed, and
“ subordinate or house drains attached, but where, from the
“ want of properly-directed supplies of water, both house
“ drains and sewers only acted as extended cesspools.”

The Commissioners assigned as general causes of the
failure of local works, the want of a competent authority
to communicate information to Local Boards, and of
properly qualified local officers. They stated, as a result
of all their local investigations, that “ an increasing opinion
“ of the very special nature of the works under consider-
“ ation, and of the special provisions required for their
“ execution was manifested in several towns: where the
“ present constituted authorities have fully and fairly
“ entered into the consideration of the means of relief
“ from the more pressing evils in question, they have con-
“ cluded by avowing their conviction of the necessity of
“ special and distinct administrative arrangements to
“ provide for them.”

The further inquiries prosecuted in relation to the me-
tropolis led to the same conclusion. Thus, the Metropolitan

Sanitary Commissioners in their first report declare—
“ The more the investigation advances, the more is it
“ apparent that the progressive improvement and proper
“ execution of this class of public works, together with
“ the appliances of hydraulic engineering, cannot be
“ reasonably expected to be dealt with incidentally, or
“ collaterally to ordinary occupations, or even to connected
“ professional pursuits, but require a degree of special
“ study, which not only places them beyond the sphere of
“ the discussion of popular administrative bodies, but
“ beyond that of ordinary professional engineering and
“ architectural practice.

“ In justification of this conclusion, and to show the
“ evil of the perverted application of names of high
“ general professional authority, we might adduce examples
“ of the most defective works which have received their
“ sanction.

The sanitary report had stated, with respect to wasteful works—

“ All these local defects again are referred back to the
“ defective construction of the Acts of Parliament, which
“ generally either presume that no science—no skill—is
“ requisite for the attainment of the objects, or presume
“ both to be universal, which in some instances actually
“ prohibit the only effectual mode of drainage, namely,
“ that from the houses into the main drains; and in
“ others, prescribe cleansing by house drains without
“ supplies of water; or prescribe the construction of
“ roads independently of drains, and direct the execution of
“ only part of the necessary means, leaving other essential
“ parts to the discretion of individuals.”

Under these circumstances, it appeared to us to be incumbent that strenuous efforts should be made, as we consider was intended by the Public Health Act, that the concession by the Legislature of the requisite local powers, should not be a licence for the repetition of previous waste and failure.

We have therefore endeavoured to complete what is practically a new system of sewerage, substituting for the former practice of laying down brick sewers in every street large enough for men to go up, a system of sewers graduated in size, each line being proportionate to the quantity of drainage to be provided for; so arranged as to concentrate and hasten the flow, instead of diffusing it over a wide surface, and thereby retarding it; imper-

meable, and therefore preventing the escape of the sewer fluid; self cleansing, instead of accumulating deposit, and consequently avoiding for the most part the necessity for flushing: a system which, as contrasted with the former, may be described as one of continuous flow instead of stagnation—one of immediate and constant removal of the refuse, instead of regular and progressive accumulation of it—and one, therefore, which fulfils the object of house and town drainage; whereas the former system did not accomplish that object, but on the contrary, by retaining the matter to be removed, allowing it to percolate into the subsoil, and placing it under conditions favourable to decomposition and exhalation, often increased the mischief it was intended to obviate.

In this system are further included arrangements for obtaining a more powerful and rapid discharge by better falls with shorter lengths, and at diminished cost, by the method of drainage at the backs instead of the fronts of houses.

With impermeable drains for the removal of town sewage, it was also necessary to combine permeable drains of the description used for agricultural purposes, in order to obviate the dampness arising from springs, or from the rain-fall over the uncovered portion of town areas.

With a new system of sewerage we have endeavoured to combine improved features in the system of water supply.

Up to the period of the sanitary inquiries just referred to, the prevalent practice was to take the nearest available supply, whether from rivers or wells, or to impound the most convenient surface flood water, the choice being usually determined, not after an extended search, and a chemical analysis of different waters, but by private interests in behalf of a particular source or mode of supply. To insure a better selection we have endeavoured to promote wider searches, and to include new sources and methods of collection, and have had careful analyses made, chiefly by Dr. Lyon Playfair.

Local Boards have generally concurred with us in avoiding river and flood water and surface washings for their supplies, and have also abandoned the practice of storing water in reservoirs, butts, and cisterns. They have for the most part sought perennial springs which yield soft water, though they may be situated at some distances from the towns. Supplies from such sources have been

obtained at Lancaster, Preston, Ormskirk, Hitchin, Barnard Castle, Knighton, Rotherham, and Launceston. These collections are commonly made by earthenware pipes, iron pipes being used in the lower districts, where the pressure is greater than the earthenware pipes manufactured in this country could bear. When necessary these collections may be aided by artificial or shallow spring collections. At Rugby, where there are no natural springs, a supply of excellent water is obtained by passing two miles and a half of nine inch earthenware drain pipes through a stratum of gravel. At Alnwick and Morpeth, also, supplies have been similarly obtained by tile drainage, after the manner of land drainage, the tiles being laid deeper. In some instances, as at Salisbury, Dover, Tottenham, Croydon, Epsom, and Selby, deep spring collection has been resorted to.

In general these collections are led into a reservoir or sump at the head of the main, so as to adjust the twenty-four hours' flow to the twelve or fourteen hours' delivery, which is constant and direct, the water being never stagnant or exposed to the light, but delivered fresh, cool, and fit for immediate drinking.

The supplies obtained by these new methods of collection, afford a demonstration of the practicability of supplying the metropolis, from the soft water springs of the Surrey Sands, with more than double the quantity of water at present consumed, and of a degree of purity entirely unknown to the population of London.

As a part of the system of combined works, we have endeavoured to connect it with plans for the application of sewer manure to agricultural production. The Local Boards are generally under difficulties, on account of their want of legal powers for carrying sewer pipes beyond their immediate jurisdiction, and of other facilities for the purpose; but it is reported that in ten towns examples of inoffensive and beneficial distribution by the method of flexible pipes and jets may be early anticipated—a mode of distribution which is already in successful practice on many farms.

We look forward with confidence to important results from successful examples of this new application of refuse which we believe will afford an increased stimulus to improved town drainage, and will exercise an important influence on the agriculture of the country, by greatly

augmenting the power of all its manures, while it will prevent the nuisances occasioned by their present waste.

We regret that in two instances the wasteful and objectionable method of distribution by water meadows has been resorted to.

As yet few Local Boards have been able to complete in a proper manner the surface paving of the streets within the towns, or to proceed with the improvement of the roads branching from the towns, commonly drained by open ditches; nor have they yet substituted covered agricultural drain pipes for open ditches, as recommended in the minutes of information on suburban land drainage. But it is reported that this method has been adopted in many instances with complete success by farmers and owners on their own lands. Its general application to suburban roads and byeways will be the means of greatly improving the drainage of contiguous private lands, as well as the sanitary condition of the uncovered suburbs of towns, more particularly the low lying and valley districts.

The chief results already obtained with reference to the diminution of expense are:

That four lower class houses may now be drained for the sum formerly charged for one.

That mains for sewerage and water may be laid on in nearly three districts at the former cost of one.

And that water, pure from its source in natural or artificial springs, may be conveyed into houses at an average of one-half the cost formerly incurred for its collection from rivers, and its storage in large uncovered reservoirs.

In almost every instance which has come within the knowledge of the Board, the contracts have been taken within the estimates, (allowance being made for the extraordinary alterations in the price of materials and service): a result which is, to a considerable extent, due to the provision of a proper survey in the first instance, on which the plans of new works are laid out in detail.

Though it is due to submit these general results as improvements already obtained, yet we believe that, with increasing experience and the continuance of the strict vigilance and scrutiny that have been exercised over plans of works, and sanctions of mortgages of rates for their execution, still further improvements may be effected.

The completion of all the new works has been impeded by the rise in price of materials and labour.

The works of several towns have been reported to be delayed by the difficulty of getting supplies of sewer and drain-pipes in sufficient quantity and of proper quality. But some judgment may be formed of the progress of the new works by the reported increased rates of the manufacture of these pipes. It is estimated that in the year 1848 there were manufactured of such pipes about 104 miles; in 1849, 416 miles; in 1850, 1,040 miles; in 1851, 1,820 miles; in 1852, 2,080 miles; in 1853, 2,600 miles; in all, as near as can be ascertained, about 8,000 miles. It is estimated that nearly one-third of the whole quantity was of the larger sizes required for sewers. On an average two miles of sewers in provincial towns serve for the sewage of the habitations of about one thousand of the population.

It appears from returns that in the metropolis between three and four hundred miles of public and private pipe sewers and drains have been laid down, and that nearly twenty-seven thousand houses have been drained with tubular drains.

The most important points of experience obtained from the extended voluntary use of sewers and drains of this material are,—

That properly adjusted tubular house drains combined with efficient water supply are, for the most part, self-cleansing.

That suitable mains, from the more concentrated flow in them, are self-cleansing in a still greater degree.

That this self-cleansing power is obtained with small falls, where continued accumulations would have been inevitable with the large and expensive works of the old construction.

And it is further shown that where the outfalls are tide-locked, pumping to maintain the self cleansing power, by a continuous flow and constant discharge, is cheaper than the cost of constructing large reservoir sewers, and perpetually clearing away the foul deposit therein accumulated.

From the scarcity of careful and skilled labour available, there has been, perhaps, as much bad work in the new pipe drainage of houses and towns, as in the pipe drainage of agricultural lands. All deviations in the way of excess from the sizes recommended, have, however, been in diminution of their self-cleansing power, or have rendered necessary additional quantities of water for the fulfilment of their purpose. Instead of the failures having arisen from the sizes recommended being too small, they

have commonly arisen from the inlets being too large, or from the protections manifestly required having been culpably omitted. If, however, all the stoppages and obstructions which have occurred, instead of being caused by gross neglect, were absolutely inevitable and inherent in the new works, they would still be cheaper and better than the old. As compared with the expense of sewers requiring to be cleansed by hand labour, the saving by self-cleansing sewers would, as we have elsewhere shown (*vide* Minutes on Town Drainage, p. 133), pay for taking them up, and replacing them at the end of four or five years—in the case of the house drains within even a shorter period—while the occupiers would during their continuance enjoy an exemption from the noxious emanations arising from drains and sewers of deposit.

Such failures as those pointed out in the Report of the Commissioners for Improving the Health of Towns, had justified a presumption of the incompetency of municipal corporations and other local authorities to provide and maintain water supplies for towns; and it was urged by the promoters of trading companies that works of this description could only be cheaply executed as a matter of trade and private enterprise.

On an examination of the water works of trading companies, in the instances in which it has been necessary to acquire such works, and to adapt them to the new system of town drainage, no evidence has appeared of superiority in their efficiency, economy, or management, over those of municipal or other local bodies. As the object of these companies is profit, they are found to have generally limited their supply to the consumers who might be expected to yield it, namely the occupiers of the higher and middle class houses. Hence the frequent failure of their supplies when an attempt has been made to extend them to the whole population, and the necessity of application for authority to enlarge the works, by the expensive process of fresh private Acts. Being under the necessity of charging the expenses of their establishments on a limited and frequently for long periods on a small class of consumers, and also of charging for the interest of capital and expenditure during the period before the supplies are taken, they driven to impose high rates.

By procedure under the Public Health Act, an early and general extension of the works to the whole population of a town is practicable and necessary, and the risks

and losses of trading companies are avoided, so that Local Boards are enabled to afford the supplies at lower rates. Local authorities under the Public Health Act have recently supplied the poorest portion of the population of their district, as above stated, at a cost of less than $1\frac{3}{4}d.$ per week.

The total cost of such supply, which is generally constant and at high pressure, including the works within the house, namely, the service pipe, sinks, water-closet, and self-cleansing drains, does not exceed $2\frac{1}{2}d.$ per week, which is less than the existing charge for cleansing a cesspool, sinking a well, and keeping a pump in repair.

Capitalists have rarely undertaken works for what they deem complex objects, such as those of water supply combined with works of drainage, and the interests of trading companies or of their engineers are against the combination of works which may take the supply out of their hands, and put them into those of a public body.

If an unprejudiced examination of the new works be made, notwithstanding the imperfections that may yet attach to them, they will be found to exonerate municipal corporations and local administrative boards from the charge of incapacity made against them; to have improved the security for good local administration, and to demonstrate that such works may be obtained more efficiently and cheaply, including the proportion of establishment charges, under local public management, by payment for common and responsible service, than by the motive of a trading profit to be levied on individual necessities.

In several instances where water has been supplied by trading companies, for house service and drainage works, the separate management of such companies as commonly constituted, has been found to be so jarring and unsatisfactory as to confirm the previous objections to any separate service.

We are informed, from the United States, that the general tendency of experience there is in accordance with our own, as to the expediency of not leaving the necessities of the population, with reference to the supply of water, to the chances of trade, or to practical trading monopoly, but of resuming the public rights and duties in this respect, putting them under public and responsible management, and adapting payments to the cost of collection and distribution without any regard to trading profits.

One advantage arising in this country from the administration of such services by a public body for the public

benefit is, that it has secured a more ready co-operation for carrying out works of public utility than had heretofore been experienced. Thus in several towns, springs of water and facilities for its collection and distribution have been afforded by proprietors on liberal terms such as they could not have been expected to give to trading companies seeking their own profit.

In Hitchin, for example, F. P. Delme Radcliffe, Esq., has given to the Local Board a fine spring of water sufficient to supply the town, and has allowed the aqueduct main to be laid through his park, past his house, and on to the pumping engine.

At Morpeth, the Earl of Carlisle has given to the Local Board all springs rising in certain lands, as also the right to lay drains and aqueduct mains to collect water for the supply of the town.

At Alnwick, the Local Board tried, during the space of many months, to treat with the freemen of Alnwick for the right to collect water on Alnwick Moor. The proposed works must have given value to the land on the moor, as some 500 acres would have been deeply drained. The freemen, however, offered so many impediments to the proposed works, that the Local Board were compelled to abandon the scheme, after having expended several hundreds of pounds on trial drains and borings during the negotiations.

His Grace the Duke of Northumberland was then appealed to by the Local Board for leave to take the water of certain springs, some three miles distant from the town, and bring the same by an aqueduct main, contouring the intermediate land, also belonging to his Grace. The Duke at once assented, and has granted to the Local Board a lease of the springs and right of way, at a nominal rental of 1*l.* sterling per annum.

Prideaux Selby, Esq., has also conveyed to the Local Board of Alnwick land for a covered service reservoir, and offered other facilities.

At Croydon his Grace the Archbishop of Canterbury has given important facilities for the storage of water for the use of the inhabitants.

At Ormskirk, the Earl of Derby has granted a lease of certain lands and springs for water-works, on most favourable terms. These works are now in full use, and are most highly appreciated.

It would be difficult to estimate the money value of

these grants, freely made with a view to the improvement of the public health.

In some towns under the Act large proprietors have voluntarily requested Local Boards to carry out all the necessary private improvement works for the poorer tenements at their (the proprietors') own cost. In Alnwick the Duke of Northumberland, who is the owner of much house property within the town, has given such an order, and the same has been done in Morpeth by the Earl of Carlisle.

Three-fourths of the outlays for such new improvement works may be charged upon the owners. In these cases, however, the noblemen named pay the whole cost of the works.

The smaller owners are often only lessees, with very short interests in the premises requiring permanent works, and they are opposed to proceedings entailing the necessity of immediate outlays. There are inconveniences in the provisions of the statute charging the expense of works upon owners which we hope may be remedied. It is from the owners of small tenements that the most strenuous opposition to the Act has proceeded.

Where there are no trading or professional interests hostile to the Act, where house drainage and private improvement works are in operation upon properly distributed charges, the opposition to the extension of such works has been generally abated.

The apprehension of another visitation of cholera has hastened the adoption and preparation of plans for permanent works in many towns.

In the towns in which combined works have been completed, and many of the former sanitary evils remedied, there has been scarcely time for any very decided general results to have become manifest. But the abolition of cesspools, the removal of house-drains of deposit, and the substitution of the self-cleansing apparatus, has been gradually followed, first by the cessation of the sense of closeness and oppression formerly experienced on entering the houses of the labouring classes; next by the mitigation of headache and of symptoms of dyspepsia; and subsequently by the diminution of sickness and the prevention of an increase, if not an immediate diminution, of the rate of mortality.

The last two seasons have been peculiarly unfavourable, both to the execution of works and the development of their

beneficial effects. The heavy rains of the last and present year have, in many instances, put the immediate sites of towns in the condition of marshes. Where no surface paving has been completed, the wet and miry roads have aggravated the existing evils, and the defective conditions without have often been sufficient to counteract, for a time, much of the benefit of house drainage and of other improvements within the houses. That the inhabitants appreciate the new works, is, however, demonstrated by the fact that, after their completion in a few houses, they have been generally adopted voluntarily. The returns show that, on an average, in only 1 in 587 cases has it been found necessary to have recourse to compulsory process. Where instances have been favourable for definite observation, as in particular blocks of buildings, the effects of sanitary improvements have been already manifested to an extent greater than could have been anticipated, and than can be readily credited by those who have not paid attention to the subject.

In one favourable instance, that of the experience of between 600 and 700 persons of the working class in the metropolis, during the period of three years, the average rate of mortality has been reduced to between 13 and 14 in 1,000. In another instance, for a shorter period, among 500 persons, the mortality has been reduced so low even as 7 in 1,000, the average rate of mortality, for the whole of the metropolis, being 23 in 1,000.

In another instance, the abolition of cesspools, and their replacement by water-closets, together with the abolition of brick drains, and their replacement by impermeable and self-cleansing stone-ware pipes, have been attended with an immediate and extraordinary reduction of mortality.

Thus in a square, (Lambeth Square,) occupied by a superior class of operatives, in the receipt of high wages, the deaths, which in ordinary times were above the general average, or more than 30 in 1,000, had risen to a rate of 55 in 1,000. By the abolition of cesspools which were within the houses, and the substitution of water-closets, together with the introduction of tubular self-cleansing house drains, the mortality has been reduced to 13 in 1,000.

In the case of the model dwellings, it might be reasonably supposed that the decrease of mortality might, in part, be due to the improved habits of the occupants, whose superior intelligence would induce them to select

dwellingings having good sanitary arrangements; but, in the instance just referred to, the reduction of the mortality was effected among precisely the same occupants, and without any change in their habits whatever.

Hitherto, when the subject of town drainage works has been considered, sewers for the removal of storm waters only, or the larger main sewers, have usually been taken into account, and exclusive attention has been given to their construction. When they were completed, it has been held, that the work of the public authorities was concluded, and the town drainage finished. It has been left to private individuals to make communications or not, as they might think fit, by private house-drains with the public sewers. Too frequently, however, they have been discouraged from doing so by the levy of a payment for the privilege.

We find that the injurious action of the causes of impurity upon the population exposed to them is as their proximity, no less than their intensity. As stated in the reports already referred to, until cesspools within houses are abolished, water-closets substituted, and self-cleansing house drains in action, main drains are of little use. Moreover, if but a small proportion of the sewerage which the main sewers are constructed to convey is brought into them, the stream, instead of being deep and rapid, will be shallow and slow, and consequently there will be the greater liability to deposit.

The experience of various places has clearly shown that main sewers alone, without systematized connexion with self-cleansing house-drainage works, are comparatively of little avail for sanitary purposes, even when they are not sewers of deposit. Thus it appears that at Liverpool, where extensive new sewers have been laid down, reported to be correct in principle and self-cleansing, the cesspools in houses being allowed to remain, and the house-drains continuing unimproved, the only reduction of the mortality effected has been from 31 in 1,000 to 29 in 1,000, even if that can be ascribed to the new sewers, and not to other improvements.

In the case of the square just referred to, when the cesspools and drains of deposit were removed, without any alteration whatever in the adjacent sewers, fever disappeared from house after house as these receptacles were filled up, and the water-closet apparatus substituted, merely in consequence of the removal of decomposing

matter from beneath the houses to a distant sewer of deposit, or to a common watercourse.

If the mortality were at the same rate as in the model dwellings, or in the improved dwellings in Lambeth Square, the annual deaths for the whole of the metropolis would be 25,000 less, and for the whole of England and Wales, 170,000 less than the actual deaths. If the reduced rate of mortality in these dwellings should continue, and there appears to be no reason to suppose that it will not, the extension to all towns of the improvements which have been effected in these buildings, would raise the average age at death to about forty-eight, instead of twenty-nine, the present average age at death of the inhabitants of towns in all England and Wales.

It may be objected that the field of observation in these examples is too narrow to justify the deduction of any general conclusion from them. The conclusions are, however, borne out by observations establishing variations in the amount of disease proportioned to variations in the extent of localizing causes, from which we can anticipate with tolerable accuracy the comparative rates of mortality among populations exposed to the influence of such causes. The individual facts above referred to are also reported to us upon careful observation, and a few such instances well observed are, as the framers of insurance tables are aware, more trustworthy than much greater numbers under varying conditions which admit of less exact observation. The facts in question are further confirmed by the results of growing improvements, in whatsoever steps improvements are attempted. They are confirmed, for example, by every month's experience of the working of the Common Lodging-houses Act, as well as by the longer experience of the almost total exemption from epidemic diseases of the inmates of new and well-regulated prisons, and of the susceptible inmates of new union houses. Nor is there any improbability in these results. The extension of the average term of life of the working classes to the age of forty-five or forty-eight is only bringing it up to the actual term attained by the middle classes. It is also to be observed in cases like that of Lambeth Square, that, great as the improvement is, it is obviously not so great as might be secured, since zymotic diseases still continue to occur there, apparently caused by the bad condition of localities in its immediate neighbourhood.

It is true that the total annual mortality of towns and districts ravaged by an extraordinary epidemic, is not always increased to the full amount of the numbers who thus perish, because many who are in this manner cut off suddenly would have been destroyed within the year by the slower operation of ordinary and more constantly recurring epidemics. By the last visitation of cholera, however, more than 40,000 (out of its 72,000 victims) deaths were added to the previous average death-rate. But these ordinary diseases are in themselves preventible, as is shown by the fact that they are for the most part banished from such establishments as those just referred to.

Our intervention has been continually besought by clergymen, medical practitioners, and others on behalf of the labouring population in villages, as well as towns, against ordinary epidemics, whose ravages are as great, and upon the whole greater, than those of extraordinary epidemics; but because the former are constantly present, and unattended by new and violent circumstances calculated to excite terror, no powers are provided for promptly and effectually dealing with them, the sums voted from the general local taxes for their relief having all reference, not to prevention, but to mitigation or cure.

Partly by the extraordinary mortality produced by these ordinary epidemics, and partly by the extraordinary amount of emigration which for some time past has been going on, there is at present in operation a two-fold drain upon the adult life and working ability of the country, to some consequences of which we now beg to call earnest attention.

The operation of excessive mortality caused by the frequent recurrence of ordinary epidemic diseases may be thus illustrated.

Excessive mortality prevalent in any town or district is preceded by excessive sickness, there being numerous cases of sickness to one death.

This wide-spread sickness, when not proving fatal in a few days or weeks, does so to a vast extent in the course of a few years, by producing slow disease in some vital organ, without leaving a single intervening day of real health or good working ability.

Even when such sickness is not sufficiently acute to produce organic disease, it causes a state of depression which renders the sufferers infirm and feeble, and unfit for hard labour. The evils, moral, social, and political,

resulting from the extensive prevalence of such a state of depression, are of greater magnitude even than those directly caused by the excess of rapidly fatal diseases.

But this state of depression is the normal condition of the great majority of the residents in all unhealthy districts and dwellings. The offspring of people in this enfeebled condition are puny and sickly; one half of the children they produce perish before they reach the fifth year of age; very few of those who survive attain a healthy, strong and vigorous manhood; the entire generation is swept away at the average age, for each individual, of twenty-nine years at most; the children born of this short-lived race are still more enfeebled than their parents, and the physical deterioration goes on increasing with each successive generation. The examination of the birth-places of residents in unhealthy districts demonstrate that the population of these localities could not be maintained, were it not for the immigration of robust labourers from less unhealthy and generally rural districts. On comparing the workmen born and bred in these unhealthy places with their parents who came from more healthy districts it is found that the descendants are lower in stature, less muscular, and less capable of labour. To such a degree does this deterioration shorten life, that in these districts it is difficult after a few years to trace the descendants of the original inhabitants.

There have been periods in the history of our own country when the like deterioration of the population has been produced by war. It is attested by statistical writers in France that the effect in recent times of the conscriptions from the adult population, to sustain the devastating wars of that nation, leaving at home only those who were incapable of military service, has been to reduce the stature and physical condition of the people to such a degree that it became absolutely necessary to lower the standard of height for recruits, which had been five feet four inches, to five feet one inch and a half.

But the physical deterioration caused by constant residence under unhealthy conditions is both more powerful and more constant than that produced by the most devastating wars.

The deaths from preventible diseases in England and Wales, from all causes and at all ages, are upwards of 170,000. The main bulk of this mortality takes place before the fifth year of age, and is produced either by

various forms of fever or by diseases of the respiratory organs; diseases which are controllable to a very great extent by proper sanitary arrangements. By far the larger proportion of those who survive the fifth year perish at the adult period of life; hence the constant excessive drain upon able-bodied life. It has been elsewhere shown that the ever active disease by which this mortality is produced is fever, and that the chief victims of this fatal malady are between the ages of fifteen and forty, the majority being between twenty and forty. One effect of this destruction of the heads of families, precisely at the time when they have the greatest number of young children to maintain, is, as has been often pointed out, to produce and keep up a state of pauperism; but it is also attended with this further evil, scarcely of less magnitude, namely, that it diminishes the natural proportion of adult persons among the working classes, and gives, on the one hand, an extraordinary preponderance of the young, and on the other of persons who have outlived the period of vigorous thought and action. The working ability of the population is thus diminished by an undue preponderance, at each extreme of life, of inefficient workers, and in the degree in which the natural proportion of the young is thus made to exceed that of the adult, the steadying principle of the community is lessened, the acquisition of productive skill is obstructed, the amount of instruction attained is abridged, the difficulty of extending moral culture and forming moral habits is increased, and instead of a population informed and sobered by knowledge and experience, there is substituted a population always young, inexperienced, ignorant, credulous, passionate, violent, and proportionably dangerous, with a perpetual tendency to moral as well as physical deterioration.

The new and extraordinary drain upon the stock of the physical strength of the nation by emigration, renders it the more important that every practicable measure should be adopted to stop the existing mortality at the adult period of life, and to render healthy and vigorous the rising generation of men and women who are to replace those who have left the country.

The new fields which have opened for labour and skill in our North American and other colonies, as well as in the United States, have already absorbed large numbers of the robust and enterprising of the adult population of our rural districts, the sources which have hitherto sup-

plied the waste of life caused by the excessive, and for the most part, preventible disease of towns. There is every appearance that the drain upon the strength and working ability of the country thus set up, will increase rather than diminish. It is guided and promoted by letters and pecuniary assistance sent by relations who have gone, to those who remain. It will probably be facilitated by the cheapening of transport, and by its increased comfort, speed, and safety. To the least ignorant and abject of the population, who now live in the filthy and crowded habitations of our neglected districts, and who see no prospect of improvements that are likely to reach them, the representation of wages to be obtained, higher than the highest town wages that can be looked for at home; the cheaper and better residence in an open country, and of land within the means of their own acquisition, must hold out a powerful temptation to try their fortune in a new sphere. In the mean time, as far as the effect of the emigration upon those who remain in unimproved localities and dwellings has yet been observed, increased wages bring only increased intemperance, which gives additional force to the noxious agencies by which they are surrounded. The last return of the Registrar General showed a marked diminution of the total amount of births, but if the average rate of births should be maintained, or even increased, it becomes a consideration of the greatest import how the social and economical consequences of the extraordinary drain upon adult life are to be counteracted. We believe this can only be done by removing from unhealthy districts the removeable causes of disease, and substituting the essential conditions of healthy existence.

We feel it to be our duty urgently to represent these circumstances as demanding early measures of co-extensive magnitude; for if the present rate of emigration continue, and the physical state of the population be not amended, both with respect to the duration of life and the physical strength of those that survive, we shall shortly be in actual want of able-bodied men, for the social, industrial, and military services of the country.

With reference to the money loss consequent on this state of things, on comparing the different rates of mortality in well conditioned and ill conditioned localities, it would appear that, taking into account the loss of labour, the expense of sickness, and the excess of funerals,

the total loss amounts to not less than 12,000,000*l.* per annum.

Now the chief preventive measures found on small scales to be productive of the most important results which have been hereinbefore stated, can be obtained, generally, only by public measures. The requisite improvements within houses, the abolition of cesspools, the introduction of adequate supplies of water, and the laying down of properly constructed self-cleansing house drains, adapted to a system of self-cleansing sewers,—it is, as a rule, wholly beyond the power of private persons, even of those in good circumstances, to effect for themselves. When the attempt has been successfully made by private persons, the expense has generally been more than double that of works systematized by a public board, and effected with the means and facilities afforded under the Public Health Act by “private improvement rates.”

We may confidently state further, that works of so special a nature as those for the new system of town drainage, for the new modes of collecting and distribution of water supplies, and for the new application of sewerage to agricultural production, cannot be reasonably expected to be carried into effect, efficiently and economically, by unaided local management. Although detailed instructions, such as engineers might act upon, have been extensively circulated, we are not aware of a single instance in which works of this nature have been effected, or are likely to be effected, excepting under the Public Health Act, and with such assistance as may be rendered by the General Board.

The extension of the Public Health Act to Scotland was barred by the passing of the Scotch Police and Improvement Act, which may be adopted by the vote of a majority of ratepayers, and which confers powers enabling towns to execute improvement works themselves. But it is reported to us that this Act has been adopted by hardly any towns in Scotland, so that, in general, these merely permissive powers are a dead letter, and even where town drainage works are attempted, they are of the character of the works so decidedly condemned by the Health of Towns Commissioners.

Recently, indeed, the errors which have been committed in some instances, have led the towns themselves to suggest the expediency of having examinations of works made while they are in progress by engineering

inspectors. We are fully aware that this would be a most important and economical arrangement.

On the other hand, large town districts afford examples of enormous expenditure for tunnel sewers, without any systematic provision for due supplies of water, or for connexion with self-cleansing house drains; sewers which are elongated cesspools, and which aggravate the evils intended to be remedied. The injury to the population, and the pecuniary waste of such works, is most grievous, and the example is obstructive to the extension of the Public Health Act.

Under the new and difficult circumstances in which we have been placed, with imperfect powers and active opposition, we have found it necessary to select towns for the application of the Act according to the apparent probability of local support, rather than the absolute necessity of the case as indicated by the rates of mortality. In districts which are the seats of the most devastating disease, no evidence has yet arisen to warrant the presumption that the most successful examples will lead to the spontaneous adoption of combined and efficient measures of prevention. Experience has shown that it is fallacious to conclude that all is well where there is no complaint. Among the population living in the lowest physical degradation, under circumstances which would be commonly deemed insupportable, we have met with scarcely one instance of complaint originating with the sufferers themselves; they are sunk too low to be conscious of their condition. It was noticed as a new and extraordinary occurrence, that on a recent inquiry working men came before the inspector to complain of the condition of their dwellings. Sometimes, indeed, women complain of the want of water, or of its excess in lower apartments, but they appear to be unaware of the effects of filth and overcrowding, as causes of mortal disease among their children.

Measures of improvement are locally advocated chiefly by medical men, clergymen, and home missionaries, who know the difference between the condition of the principal streets and thoroughfares of towns, and that of the quarters occupied by the poor, with respect to the state of which the middle class, and even local public authorities are in general entirely ignorant. Our inspectors are instructed to obtain from the local registrars a list of the chief seats of epidemic diseases in the towns they

visit, and to take with them, on their personal inspection of these places, the promoters of the inquiry, the local authorities, and especially the opponents of the Public Health Act. The common result is to elicit from those holding local position and office, an acknowledgment that they knew nothing of the real condition of their own town, as far at least as relates to those portions of it which are occupied by the majority of the inhabitants. The sight of these localities, appropriately termed "fever nests," has often stopped all further hostility to the Act, by converting opponents into advocates.

Towns, as well as classes, which are acquainted with no other standards of health than their own, are often no better informed on this subject than the poorest portion of the population. In Liverpool, one of the most prosperous as it is certainly one of the most unhealthy towns in the kingdom, the local belief was that it was among the most healthy. Recent inquiries had revealed the fact that in this town 30,000 persons lived in cellars. The statement was at first vehemently denied by the members of the Town Council, though, on an actual examination by the police, the number returned was 34,000. In Manchester also, the next in prosperity as in unhealthiness, where the deaths from preventable disease amounted to between two and three thousand annually, it was the belief even among medical men that the town was remarkably healthy, and this supposed state of high general health has been referred to in works of economical authority, as resulting from high wages and constant employment. It is not from within, but from without, that an approximation has been obtained to the true condition of the great mass of the population, and we are warranted by experience in stating that arrangements for the improvement of the public health, on any other basis than an aggressive one against the physical causes of disease, any assumption that the absence of complaint is proof of the absence of evil, will not only prevent the completion of what has been commenced, but will counteract much of what has been already effected.

We now beg to bring under notice some circumstances which have been made the subject of comment and censure both in and out of Parliament.

Objection has been taken to the method of applying the Public Health Act, either by Provisional Order confirmed

by Parliament, or by the more cheap and speedy method of an Order in Council. We submit that it is important that the real weight of any objections to these modes of carrying into effect economically, speedily, and efficiently, the improvements intended by the Legislature, should be investigated.

The great expense of Local Improvement Acts, amounting on an average to no less a sum than 1,627*l.* for each opposed Act, according to one return, or 2,000*l.* according to another, a cost which, in many instances, is a denial of the means of improvement, had been the subject of inquiry by Committees of the House of Commons, and had led the Legislature, before the passing of the Public Health Act, to consider some means of lessening this expense.

The preliminary inquiries, authorized by the Department of Woods and Forests, into the merit of proposed local improvement Acts, had this object.

The alteration originally intended was, that a public department should, upon petition, have the initiation of plans; but the procedure was so framed as not only not to give them such initiation, but to prevent the officers employed as inspectors from having the means of working out any plans, as alternatives or substitutes, or of entering into the examination of any such plans which might be proposed.

These officers had no proper *locus standi* provided for them before committees, which, it is stated, being anxious to shorten their labours as much as possible, in general heard only what they were obliged to hear, the case of the promoters. The opposition of the inspectors being of little avail when they disapproved, their approval was not deemed of value to compensate for the expense, in addition to the other expenses, which were undiminished. Nevertheless, enough was elicited to show that preliminary local inquiries might be made highly advantageous.

The average expense of these first local inquiries in 1847, appears to have been 165*l.*, comprehending generally only a part of the objects included in the Public Health Act; the further cost of printing the reports would probably have brought the total expenditure up to 200*l.*

The expense of the application of the Public Health Act, by order, which embodied comprehensive measures of local consolidation, has been on an average :—

	£	s.	d.
For the provisional order, confirmed by Act of Parliament, including the engineering inspector's expenses, report and local publication	136	1	2
For Orders in Council, including the engineering inspector's preliminary examination and report, &c.	88	2	0
General average -	£112	1	7

In two cases the combined works and comprehensive objects provided for under the Public Health Act, were sought to be obtained by Local Acts, and by ordinary professional assistance ; one was for the town of Reading in Berkshire, and the other for the City of Dublin. Both were the subject of preliminary inquiries by the department of Woods and Forests.

The expense incurred for these inquiries was, for Reading 900*l.*, and for Dublin 800*l.*

We have no information as to the further cost of the bill for Dublin, but the total expense of the bill for Reading is stated to have been 8,000*l.*, and after all the bill was defeated by the opposition of a water company. Subsequently the Public Health Act was sought by petition of the inhabitants of Reading, and has been applied at a total expense of 140*l.* 19*s.* 3*d.*

The estimate of the cost of works for which the authority of the Local Act was sought, was 60,000*l.* The cost of more efficient works under the Public Health Act, is estimated at 25,000*l.*

In the instance of Carlisle, plans were obtained for works to be executed under the authority of a Local Act by an eminent railway engineer, who estimated the outlay required for street sewers at 70,000*l.* These would have been on the old system, and mostly sewers of deposit. Plans have been sanctioned under the Public Health Act for a complete set of self-cleansing sewers, for 23,000*l.*

The following are further examples of the relative cost of old and new works in the following fourteen towns. The amounts are given in round sums:—

Town.	Cost of Construction of Self-Cleansing Pipe Sewers.*			Cost of Construction of Sewers for Men to Cleanse.			Annual Instalment to pay off the Amount, with 4½ per cent. Interest in 30 Years.	
							To pay off Cost of Self-Cleansing Pipe Sewers.	To pay off Cost of Sewers for Men to Cleanse.
	£	s.	d.	£	s.	d.	£	£
Rugby - -	3,600	0	0	14,976	0	0	221	919
Woolwich - -	15,500	0	0	47,663	0	0	951	2,926
Croydon - -	9,500	0	0	39,500	0	0	583	2,424
Tottenham - -	4,000	0	0	10,000	0	0	245	613
Ottery St. Mary	900	0	0	2,113	0	0	57	129
St. Thomas, Exeter - -	1,194	0	0	6,155	0	0	73	377
Barnard Castle -	1,800	0	0	3,709	0	0	114	227
Southampton -	26,063	16	3	53,713	7	0	1,600	3,297
Coventry - -	17,500	0	0	36,065	0	0	1,074	2,214
Lancaster - -	7,500	0	0	12,000	0	0	460	736
Ormskirk - -	3,000	0	0	6,000	0	0	184	368
Hitchin - -	3,300	0	0	7,000	0	0	202	429
Alnwick - -	3,500	0	0	7,500	0	0	214	460
Morpeth - -	1,500	0	0	3,000	0	0	92	184
Total Cost -	98,857	16	3	249,394	7	0	6,070	15,303
Average Cost of each Town }	7,061	5	5	17,813	17	7	£433 11 5	£1,093 1 5

* In several of the above towns some small brick sewers are included. In Southampton one district has been completed, with an area of about 47 acres, comprising 316 houses, and at a cost of 869*l.* for self-cleansing pipe sewers. The estimated cost for sewers for men to cleanse in this same district was £1,952.

While the smallest sized sewer proposed for streets in the Metropolis costs - - - - - 11*s.* 0*d.* per foot,

The average cost of the entire public drainage in Rugby, Tottenham, Barnard Castle, St. Thomas Exeter, and Ottery St. Mary, has been - 1*s.* 9*d.* per foot.

By the procedure under the Act, the following new and popular securities for publicity and economy are obtained :

1. More effectual local publication, by prescribed notices in local papers and otherwise, that the preliminary inquiry is about to take place.
2. Local examination by specially qualified and responsible engineering officers (*vide* Instructions in Appendix XI., p. 98.)
3. Local and public examination by and before rate-payers, and explanation to them of the objects aimed at and means intended to achieve them.

4. Local publication of the report as to the existing condition of the town, the new works proposed, and their probable expense.
5. A responsible Public Board for consideration of the proposed local measures, and as a court of appeal to private parties as respects certain classes of works.

With reference to provisional orders, it has been the practice of the Board to send the drafts of every order for examination to the town clerk, or other competent local officer, who usually consults a local committee as to the applicability and completeness of its provisions; and after the order has been agreed upon, signed, and sealed, it is published locally, that the ratepayers at large may have an opportunity of objecting to any of its provisions before it is confirmed by Parliament.

The general efficiency of the Act has, however, been materially circumscribed by the want of those supplementary powers which experience has shown to be requisite for the accomplishment of some of its minor objects, and the successive addition of which, as the proved necessity for them might arise, was, we believe, originally intended by the Legislature.

It was not deemed expedient to encumber the Act with working details, in the attempt to provide for everything that might be required, in all places and under all circumstances: it was thought more desirable to introduce, from time to time, such modifications and additions as experience might prove to be necessary into amending Acts. It was conceived in Parliament, that such amendments would be chiefly needed in the more populous districts, already provided with Local Acts; but petitions for the application of the Act have come to us in unexpected numbers from smaller towns, and even from villages which have no Local Acts or sanitary powers whatever, which could not afford the ordinary expense of Local Acts, and in parts of which the rate of mortality from defective sanitary arrangements is often higher even than in cities.

One of the main principles of the Act was to consolidate the various separate, independent, and conflicting establishments for executing and regulating public works, which could be efficiently and cheaply managed by one set of officers under one local administrative authority.

In the smaller towns it is only by the combination of works and service for paving, lighting, markets, roads, &c.,

that the works can be executed or superintended with the economy which is essential. It was intended that provisional orders should be in all respects new Local Acts, so framed as to include the whole of those objects; and it is expressly set forth by the 10th clause, with respect to places to which it is proposed to apply the Act, and within which there is no Local Act (inquiry into the state of burial grounds being provided for by sec. 8), that the Board shall make a provisional order under their hands and seal of office, "*With such provisions, regulations, conditions, and restrictions, with respect to the application and execution of this Act, or any part thereof, in all respects whatever, as they may think necessary, under all the circumstances of the case.*"

With the view of carrying into effect the intention of the Legislature in this respect, a clause was introduced, in the first confirming Act, to enable some Local Boards *to meet the peculiar circumstances of their cases*; to enable them, for example, to contract with companies for the supply of gas; but, subsequently, an objection was taken to the introduction of similar supplementary clauses until the general measure should be revised. One consequence of this decision has been that professional persons have taken advantage of the delay, since 1851, to multiply Local Acts, and so to frame them as to defeat the securities and objects intended by the Public Health Act. We might adduce several instances where Local Acts have been substituted for the Public Health Act, at a cost which would have paid for a large proportion of the chief works required.

In several instances, the inhabitants of towns for which Local Acts have been promoted, have petitioned the Board for protection against the waste to which they would be subjected by them, they themselves having no means to defray the expense of an opposition, whilst the attorney promoting such Act obtains power to levy the expenses of the Act from the rates. In two instances the representations of the Board have prevailed with committees; but in others, from want of means to bring up witnesses, and from having no *locus standi* in behalf of the inhabitants, the opposition failed. But the protection sought would have been rendered unnecessary if the supplementary powers in question had been granted, the omission of which forms the pretext for the Local Bill.

At Newcastle, the scene of the late attack of epidemic cholera, the introduction of the Public Health Act was resisted and prevented by means of a Local Act.

The introduction of the Act into Birmingham was frustrated by the substitution of a Local Act, at the cost, it is stated, of 10,000*l.* to the ratepayers.

Several other Local Acts, to the exclusion of the Public Health Act, have been recently promoted under similar circumstances.

The working of the Act has been impeded by the want of means on the part of the Board to send Superintending Inspectors to visit Local Boards, in order to aid them with such advice as their knowledge and experience might enable them to afford, and by the want of power to provide legal and binding forms and byelaws for facilitating the general working of the Act.

In consequence of these defects, local boards with new and special functions to exercise, (though the public cost to the state would have been trivial as compared with the money saved to the locality,) have not had those working aids which were afforded for constituting and assisting the first action of boards of guardians under the Poor Law Amendment Act.

Objection has been made in several instances that we have interfered unduly and unnecessarily with the proceedings of local boards.

It will be found, on the contrary, that the more general complaint has been that we have had no power to render local boards, new in office, and called upon to administer a measure of a new and special nature, the assistance which their position required. One ground of opposition to the control exercised under the Public Health Act has been, that it would lead to interference and increased expense. In every instance in which the General Board have deemed it their duty to withhold their sanction to plans of works proposed by Local Boards, it has been on the ground that the works in question were unnecessarily expensive.

We have received urgent representations as to the saving of time and expense, and the removal of doubt and difficulty, which would be effected, if the General Board were once for all to settle for Local Boards, among other matters, such as questions relating to surveys, to forms for keeping and auditing accounts, and to those for legal notices and their issue.

Under the impression that full provision had been made for rendering them such advice and assistance, we have received from Town Councils and Local Boards, twenty-four in number, including such towns and cities as York, Coventry, Dover, Gloucester, Southampton, and Salisbury, a request to name an engineer for planning out and taking the responsible superintendence of their works.

We have received from Hull, and ten other towns, requests to examine the qualifications of the persons selected by them as surveyors, or to advise as to the appointment of those officers. In twenty-five instances, local surveyors have been sent up, or have applied for instruction in laying out works, from the Board's chief engineer; and forty-four towns in all, have engaged the services of the Board's engineering inspectors for the preparation of plans and the general superintendence of their execution, making, together, sixty-nine towns in which local boards have voluntarily sought the assistance of the General Board's engineers.

Professional objections have been taken, particularly on the part of engineers, to the employment of the superintending inspectors under Local Boards.

Representations have been made to the effect that these officers have first been paid salaries by the General Board, and then have received payment for their services from local boards; but it is hardly necessary to state that the payment of the superintending inspectors is regulated by Parliament, which prescribes their rate of remuneration *per diem*, and declares that they shall receive payment under the Act only for the time during which they are on actual service, thus intentionally leaving them at liberty to take private practice. Their mode of remuneration is, therefore, in strict analogy with that of the inspectors under the Commons Inclosure and the Land Drainage Commissioners, and we apprehend this analogy was advisedly followed by the Legislature, it having been the intention of the framers of the Public Health Act to render the practice the same under both Acts. Under the Land Drainage Commission, the officer who reports at one time on the eligibility of drainage works for tracts of land, is commonly retained by private owners to plan the scheme of drainage, and superintend its execution; in which case, however, the Commissioners generally send another officer to examine and report on the works, who

is responsible for ascertaining that they are such as to justify the conditions of the mortgage.

In the present instance, however, the employment of the superintending inspectors appeared to be a matter of necessity. When application was made to us by Local Boards to recommend engineers to them, we apprehend it was simply because they were acquainted with no one on whom they could rely as having executed economically, and within the estimates, improved town drainage works, or as having afforded evidence of practical attention to the sanitary requirements of a population.

The assumption, founded on general qualifications, of fitness to execute these new and special works was proved to be fallacious. In recent instances, many large outlays had been incurred in the construction of tunnel sewers at extravagant cost, resulting only in extended cess-pools, and increasing the amount of noxious evaporation, such as may be smelt from the openings of the greater part of the sewers of the metropolis. What there was of old practice had to be unlearned. It may be said that the new system of combined works of house drains and sewers which are self-cleansing, and which remove all refuse before it can enter into decomposition, are as distinct from the old works, which detain and accumulate deposit, and require men to cleanse them, as old roads on the best engineering construction, differ from railways. Out of 140 persons who tendered plans for the drainage of the metropolis, there were only a very few who had had opportunities of studying the sanitary requirements of the population, and therefore who in any degree met them. The plans obtained by local boards upon advertisement or by competition, have been generally as unfortunate.

We should have been extremely glad if we could have seen in any general antecedent practice, evidence to justify us in recommending to local boards, in the first instance, persons unconnected with the General Board, but at that time we saw no such evidence. We could ill spare the superintending inspectors from their own official duties, and their partial withdrawal therefrom has necessarily occasioned delay in the execution of other pressing business. This inconvenience has, however, been attended with this compensation, that the inspectors have been obliged to master practical difficulties, and that successful examples of combined works may be early expected in upwards of forty towns. These examples, we confidently hope, will be

followed by independent private engineers, as has indeed been the case already in some instances, to which reference has been made in the Minutes of Instruction ; and we consider it desirable that the inspectors should now be put upon the footing of inspectors to Poor Law Boards, and enabled to give their general and ordinary services gratuitously in aid of local boards.

It may be proper to observe here, that one of the chief sanitary defects in private and public works has arisen from the general want of attention, on the part of architects and engineers, to the effects of their arrangements upon health.

Though the emanations from sewers containing cesspool deposits are sometimes so intense as to produce suffocation, and their influence in causing fever and other forms of zymotic diseases is admitted, yet engineers of eminent name still contend for the construction of such sewers, and for the practice of employing men to go up them to cleanse them ; while architects, not unfrequently, so arrange the drainage of houses as to bring extended cesspools immediately underneath living rooms. It has been one of the duties of the Board to urge the consideration of the effect upon the public health of the construction of public works, and to combine the services of medical with those of engineering inspectors. Though the means of the Board for effecting this combination of services have been inadequate, yet inspectors specially acquainted with the principles of sanitary science, are now engaged in tracing the effects of local arrangements upon health, and in examining the results of the new works completed or in progress. As far as the union of services has been tried, the result proves the necessity of making it more constant and intimate.

With reference to the inspectors under the Public Health Act, it must be further stated that several of the applications to the General Board to name engineers for planning and superintending local works, have come from Town Councils or Local Boards who had been hostile to the introduction of the Act, but who, on its application, have deemed it their duty to seek for what they conceived to be the most experienced assistance for its efficient and economical execution.

Statements have been made, and returns moved for, under an impression that our expenditure has been in excess of estimates. Had it been so, the unexpected and

extraordinary services already referred to might have accounted for and have justified some such excess.

But the following is a comparison of the actual expenditure, with the sums voted during our period of service :

	Voted.			Expended.		
	£	s.	d.	£	s.	d.
For year ending 30th September 1849 - - - - -	15,152	0	0	14,730	12	1
Year and six months ending 31st March 1851 - - - - -	20,700	0	0	18,928	10	11
Year ending 31st March 1852 - - - - -	9,969	0	0	9,278	14	1
Year ending 31st March 1853 - - - - -	10,745	0	0	11,748	1	9
Nine months, to 31st December, 1853* - - - - -	8,997	0	0	9,283	5	8
	65,563	0	0	63,969	4	6

The expense of the extraordinary services, not included in the estimates, amounts to about 8,000*l.*; still the votes, owing to economies in other matters, have been found more than sufficient to cover this unlooked-for expenditure.

Of the total sum voted, about 23,500*l.* will be repaid by Local Boards; the annual average ordinary expense therefore of the Board during its five years and three months of action, (an expenditure having for its object the saving of several millions now spent in the relief of preventible disease) has amounted to about 4,930*l.*

It has been further objected that we have incurred expenditure without the due and formal sanction of the Treasury. On one occasion we felt ourselves under the necessity of doing so. It was in 1849, during the height of epidemic cholera in the metropolis, when the deaths from this disease reached the alarming number of upwards of 2,000 weekly, and when the appointment of additional medical officers for arresting the progress of the pestilence had become most pressing.

Under these circumstances Lord Shaftesbury went over to the Treasury to explain the emergency, but found no principal member of the Government there. We then, on

* The vote for the year was 11,996*l.* The above sum of 8,997*l.* is the proportion of the vote to 31st December, 1853. Balance of votes over the expenditure and the liabilities was 443*l.* 15*s.* 6*d.*

our own responsibility, appointed the officers, and six weeks afterwards, in the usual course, we received their Lordships' sanction.

We have endeavoured to control our expenditure with an observance of the discretion usually exercised by Boards whose duties are restricted to the administration of ordinary civil business, and the temporary delay of which would entail no injury, suffering, or loss of life. But it is, as we have already shown, one peculiarity of the service in which we are engaged that, when epidemic disease breaks out, an occurrence which is usually sudden, there is not only a money loss by delay, but all delay is at the expense of pain, misery, and preventible death, and defeats the entire object of the administration.

For this reason we have been compelled, through the whole term of our service, to hold boards without intermission, irrespective of the usual vacations. The paid members of the Board have not intermitted their labour for a day, except on the occasion of severe illness, which has once happened to each. The table of attendances (*post*, p. 54,) will show how seldom also the unpaid member of the Board has been absent.

We are aware that, in the discharge of the duties which have devolved upon us, we have unavoidably interfered with powerful interests, which have the immediate means of making themselves heard by members of Government and of Parliament.

Provisional orders which supersede Local Acts have interfered extremely with the professional emoluments of parliamentary and other agents.

With preceding Commissioners of Inquiry we have been under the necessity of stating facts with relation to the inefficiency and waste of former works, and their effect in aggravating existing evil. These expositions, required for the protection of the public against the extension of like works, amounted to the condemnation of the professional practice concerned in them, and militated also against the interests of contractors for their maintenance and execution. Where large amounts of money had been invested in such works, as in those for the supply of water, and for cemeteries, the hostility of trading companies, of directors, and of shareholders has been induced, and their hostility, coming from persons holding a public position and whose direct interest was unexplained, appeared to have been based on public grounds.

The scheme we proposed for improved and economical extramural burial endangered the emoluments of cemetery companies and the entire body of trading undertakers.

The demands on their time and energy which, for the saving of life, we were obliged to make on boards of guardians during the prevalence of cholera, excited in numerous instances loud complaints. We have already stated the general and favourable change which has taken place in the opinion of boards of guardians and other local authorities with reference to our proceedings on that occasion.

The report in condemnation of the present sources and works for the supply of water to the metropolis, necessarily excited the hostility of existing water companies, as well as of those who were before Parliament with plans for the extension of similarly constructed works from similar sources.

The requisition in accordance with the Act and with the recommendations of the Commissioners for improving the Health of Towns, that surveys should be completed in detail before any new works were undertaken, scrutinies into the efficiency and economy of the plans for town drainage and water supply, caused the active hostility of professional engineers who were unaccustomed to such checks, and who were now called upon to change their principles and practice of construction, and at the same time to reduce in particular cases their emoluments, (always proportioned to the amount of expenditure,) to extents such as are set forth in the instances before given. (*Ante*, p. 40.)

These hostilities have been indicated both by the circulation throughout the country of misrepresentations of facts, and by suppression of facts, and in some instances, as has been already stated, by organized opposition.

To carry the provisions of the Public Health Act into extensive operation, the reduction of expense, as well as the improvement of works, was indispensable. It was foreseen that the attempt to reduce scales of charges and professional emoluments would be met by powerful opposition; that opposition has been encountered, and has been strengthened by the opposition of parliamentary agents and of others interested in the passing of local Acts.

The engineering opposition has been thus conducted. Instances of negligences and defects in the local execution of new works, causing partial failures in portions of them, have been collected, printed, and circulated, as exemplifying the operation of the system recommended by the General Board, and have been sent to all Local Boards.

Thus a group of common lodging-houses occupied by the lowest order of Irish, in some instances as many as forty in one house, was selected; and the facts of that single case propagated as the metropolitan experience of the "unsuccessful results of the system of pipe drainage;" the fact being kept back that only in a small proportion of the cases where water-closets and pipe drains had been laid down had there been any proper supply of water; while at the same time, in the metropolis, in a number of other blocks of buildings, and upwards of 20,000 single houses, the pipe drains were working satisfactorily; the demand for them increasing at a rate with which the manufacturers had difficulty in keeping pace.

Accounts of particular stoppages of pipe sewers were promulgated without any reference to the circumstances which showed that they might have been expected to stop; without any notice of the large proportion of good work executed where nothing of the kind had occurred, or any allusion to the expenses of cleansing, the failures, and the cost of maintenance, as well as the sanitary evils of the old works. At Croydon some of the works had been constructed on erroneous principles against express instructions, and had been carelessly and negligently executed, and the natural failure of such faulty works has been pertinaciously represented to be the failure of the system.

A proportion (about six per cent.) of the house-drains had been badly laid, chiefly by private bricklayers without superintendence. The inlets both to the house-drains and the public sewers had been left unguarded; stoppages had occurred, in the proportion of about one-sixth of a mile to seventeen miles of pipe sewage. These stoppages had been caused, not in consequence of the sewers being too small, but as appeared, on subsequent examination, from the inlets being too large. No provision in the specifications having been made for the thickness and strength of the pipes, the makers competed with each other in making them as thin as possible, and it is matter of surprise that there had been so little breakage, not amounting to more than one hundred and fifty yards in an unusually deep cutting. There being, in the then state of the market, no pipes readily obtainable which could be relied upon for the particular purpose, the expedient of a relieving arch of brick over the pipe was used for the length of the deep cutting. Notwithstanding the decisive proof of success with more than sixteen miles of sewer, state-

ments were promulgated that the system of works had proved a total failure, and that it had been necessary to return to the use of brick culverts on the old system. In spite of the fact, that with the exception of the stoppages in question, the whole of the pipe sewers in the streets were self-cleansing in an extraordinary and unexampled degree, and had never been half filled, conclusions were reported and promulgated, as from actual experience, that it had been found absolutely necessary to return to brick sewers of deposit, large enough for men to enter and cleanse away the accumulations of noxious deposit.

While the new works were in progress and approaching completion, an extraordinary epidemic which has prevailed in different parts of the country, in places where there are no new works whatsoever, attacked the higher class of houses in Croydon, those with old as well as those with new works. The disease was immediately ascribed to the operation of the new drainage works, although the first and most severe visitation of the epidemic was at the distance of upwards of three-quarters of a mile from the places where the works were going on. After the prevalence of the disease elsewhere had been shown, it was still alleged that the works at Croydon had aggravated it, notwithstanding the fact, that if the deaths had been in the same ratio as at Oxted, in the same county, which was deemed well situated, but undrained, they would have been one-third more numerous; or if they had been in the same proportion as at Sawbridgeworth, where the localizing causes were greater, they would have been more than doubled; or if they had been in the same rate as at Sheriff Hutton, where the localizing causes were still more aggravated, they would have been increased six-fold. The alleged causes of the epidemic at Croydon, the defective works, continued, but the disease itself has disappeared.

It was alleged that the works which were testified to have introduced good water, and to have removed foul smells from the poorest class of habitations, were a calamity; yet, such was the local appreciation of them, that the greater proportion were adopted voluntarily, and builders undertook, after hearing all that was promulgated against them, to pay the expense of the branch sewers themselves, that their houses might be connected with the system of tubular drainage out of their turn.

Some judgment may be formed of the ground of the opposition on the part of persons profiting by the preparation of private and local Acts, and by the works sanctioned

by them, when it is considered that, by the method of modifying and incorporating local Acts with provisional orders, between two and three hundred thousand pounds have been already saved to the local administration of the country, compared with what would have been the expense of private Acts.

According to the lowest return of the average expense of Local Improvement Acts, viz;—1,627*l.*, there will have been saved 214,000*l.* of expenses, or, according to another average, 380,000*l.* There is reason to believe that this is a low comparative average, inasmuch as the Local Acts referred to are usually for single objects, as for water alone, or for paving and lighting alone.

Extensive opposition has been raised to the application of the Public Health Act, and hostility created against the members of the Board, and the new works promoted by them, originating apparently in the view that there has been an interference with professional emoluments, to the extent of the clear reduction of these expenses, whereas the interference which would have been justifiable in every case, could really have extended to very few cases; for if the former rates of expense had continued, they would have operated as complete barriers to the improvement works now in progress under the Public Health Act, and in the great majority of instances, to any applications whatsoever to obtain legislative sanction in the usual form.

We may further state one illustrative example of the nature of the opposition we have encountered. Under the Nuisances' Removal and Diseases' Prevention Amendment Act, the scheme for a new cemetery cost 70*l.* instead of from 800*l.* to 2,000*l.*, which would have been spent in proceeding for a private Act. On this occasion, an intimation was received by our officers from parliamentary agents, that the course adopted by the board was an interference with their professional emoluments, which would render it necessary on their part to raise opposition against the continuance of the Board itself.

One course adopted by those who are interested in opposing the economies and securities afforded by the Public Health Act, is to recommend the substitution of a sanitary measure which shall be compulsory on all towns, without any provision or control with respect to the expenditure. This is the course of opposition selected by engineers. It is unnecessary to observe, that if this recommendation were adopted, it would increase the evil of wasteful and inefficient works, the burthen of which already presses

on many of the most important towns and districts so heavily as to occasion an insuperable obstacle, at least for the time, to urgently-needed improvements.

With respect to the important trust imposed upon us, of examining works before sanctioning mortgages of rates, in order to ensure that such works shall be of value equal to the outlay, for a period co-extensive with the term of the mortgages, it is to be observed that the practice of the Treasury has been to cause notice to be given in the locality that it was proposed to undertake such and such new works ; and if no local objection were raised, to issue the consent. Information has been communicated to us respecting cases where consent has been given, under circumstances which prove the entire insufficiency of this procedure to insure the protection intended,—where, for instance, the towns-people have been wholly unaware of the nature and expense of the works in question which competent inquiry must have elicited. We are satisfied, from our experience, that the examination of plans for works ought to be extended rather than diminished, and both the responsibility under which it is done and the power of doing it increased.

Notwithstanding the obstruction to the working of the Act, we are aware of only six, out of 182 Local Boards, which are in a state of antagonism with the General Board.

Two of these hostile boards, under the influence of small owners of the description of property requiring amendment, manifested their determination not to execute the Act, by an attempt to dismiss their surveyors, with a view to the entire breaking up of the boards, an attempt which we were bound to resist, because we could not sanction the removal of those officers without just and legal cause. With reference to two other hostile boards, plans of works were proposed which we could not sanction, on the grounds that the works themselves were not the most efficient, and that they were unduly expensive. On our withholding our sanction to these works, the parties interested in them made loud complaints of uncalled-for interference. In another town, in which the engineer employed has been at variance with the General Board, it was found necessary, on examination of the proposed works, to insist on a reduction of 24 per cent. on the gross sum, for which the sanction for a mortgage of the rates was sought. The performance of this duty was followed on the part of the engineer and others by Parliamentary opposition and complaint.

We are aware of no instance in which we have experienced hostility, but on some similar ground.

With one or two exceptions, there has been, during the whole time of our service, a perfect unanimity of opinion and action among the members of the Board. Even with reference to the few questions on which we dissented from one of our presidents, had it been possible to bring under consideration all the evidence with which those members were familiar whose attendance at the Board was constant, we believe there would have been no difference of opinion, on the part of any Minister or Department, as to the practical course proper to be taken.

The following is a list of the attendances at the Board. It is necessary to explain, however, with reference to our first president, the Earl of Carlisle, that his attendance was much more frequent than is apparent from the subjoined table: for, when he was prevented by his other duties from being present at the regular meetings of the Board, scarcely a day passed in which he did not come to the office to inquire particularly into the day's business. The like attendance, especially in consultation on all important measures, which have been invariably reserved for him, has been given from the first by our unpaid member, the Earl of Shaftesbury, who, excepting when absent from town, has been daily present, even when his engagements prevented him from being at the Board at the hour when its meetings are ordinary held:

Year.	Number of Board Meetings.	NUMBER OF TIMES MEMBERS PRESENT.						
		Earl of Carlisle.	Lord Seymour.	Lord John Manners.	Sir William Molesworth.	Earl of Shaftesbury.	Edwin Chadwick, Esq., C.B.	Dr. Southwood Smith.
1848	74	3	"	"	"	22	71	71
1849	226	47	"	"	"	172	217	211
1850	216	8	4	"	"	147	214	162
1851	237	"	3	"	"	101	232	225
1852	247	"	"	8	"	79	247	246
1853	245	"	"	"	19	93	230	235
Total	1,245	58	7	8	19	614	1,211	1,150

A very large proportion of the correspondence of the Board has consisted in answers to applications for advice,

or for opinions on questions both legal and sanitary, directly or indirectly arising in the execution of the Public Health Act. Legal opinions alone, not far short of 2,000, have been given in answer to such questions, and the Board have reason to believe that much expense and litigation has thus been saved to Local Boards.

We have been frequently called upon to exercise an appellate jurisdiction upon appeals, besides those directly under the Act, such as the appeals from private individuals aggrieved by proceedings of Local Boards, with respect to the imposition of private improvement expenses. We have been called upon by minorities, as well as by private individuals, to exercise a voluntary jurisdiction by representations in their behalf with Local Boards with respect to the administration of other portions of the Act: we have been appealed to by the owners of water works against the proceedings of Local Boards; and by Local Boards for advice or for the aid of engineering inspectors against what they considered the undue exactions of trading water companies: we have been appealed to by one Local Board on cases arising out of the conflict of jurisdiction between that Local Board and another adjacent local authority: we have been appealed to by Local Boards to inquire into and arbitrate upon professional charges made against them, and on cases of disputes as to the remuneration of officers. We have also been appealed to by surveyors against Local Boards, and by Local Boards against surveyors. With such means as were in our power, chiefly upon the hearing of parties and reports of inspectors, we have endeavoured as far as practicable to satisfy these demands, which are increasing in frequency and importance.

We would now advert to the work which we have in a forward state of preparation, undertaken chiefly at the instance of Local Boards, as being requisite for the public service in protection of the public health.

Materials for a general Building Act, with a view to the prevention, as far as practicable, of the extension of the diseases attendant on bad sites and defective structural arrangements in town districts.

A Bill for the execution of important sanitary works in rural districts, in extension of the 50th section of the Public Health Act, which has hitherto been inoperative.

Information on the sanitary and economical construction of model lodging-houses and model dwellings for the use of Local Boards of Health.

Information on the paving and the construction and maintenance of roads.

Information on the collection and distribution of water for the use of towns, supplementary to the information already published on the drainage of the sites of towns, the drainage of houses, and the application of sewer water and refuse to agricultural production.

Information on the practice of quarantine, with relation to plague, completing the report on the three great epidemic diseases, cholera, yellow fever, and plague, the spread of which from country to country, and city to city, is commonly conceived to be controllable by quarantine.

The chief portions of the minutes of information on town drainage have been translated into French, and those on the application of town refuse as manures of towns into German, and they have also been adopted as text books for agricultural schools, and at the request of Sir John Burgoyne, the Inspector General of Fortifications, copies have been provided for the use of young engineers. From such cases we hope that the information will be found to be useful beyond the more immediate and particular objects of local administration.

In the preceding account we have confined ourselves to the submission of considerations which appeared to us to have an immediate bearing on the arrangements which are requisite for the completion of sanitary works in the towns already under the Act, and we have abstained from adverting to any provisions which would be desirable in the reconstitution of a General Board of Health.

In conclusion, we would submit for examination as due to ourselves, the state of the measures connected with the public health which were committed to our charge, and the manner in which they have been dealt with by us, amidst much difficulty and obstruction.

We venture to state that it will be found—

That no one measure has been left unadvanced, though the progress we have made has been effected with imperfect means, and against ignorance, prejudice, and very powerful adverse interests.

I.—That with regard to the extraordinary services required of us under the Diseases Prevention Act,—

We were called upon on first entering on our office to deal with a new and most formidable pestilence, the true character of which was then but little known, and respecting

whose mode of propagation erroneous and mischievous opinions generally prevailed.

That we laboured earnestly to correct those opinions, and particularly to call attention to the symptoms premonitory of an attack of the disease, to the localizing conditions on which its development depends, to the real safeguards against it, and to the most effectual means of checking its progress.

That the results of the preventive measures founded on these views, wherever the preventive system has been tried, have satisfied the medical authorities of this country, as well as the general body of medical practitioners, of their truth and practical importance, and we have reason to believe that these views are now acquiesced in by the Academy of Medicine of France, and by the chief medical authorities throughout Europe.

That from the more extended knowledge of these preventive measures, and their more cordial acceptance by local authorities than when they were first proposed in 1848, we have reason to hope that they will prove more efficient than they did then, should the return of the pestilence, which now again seems to be impending, call for their adoption.

II.—That we have entered into a laborious investigation of epidemic cholera, yellow fever, and plague, as far as these epidemics are connected with the subject of quarantine. The conclusions we presented in our reports in reference especially to the two first of these diseases have received the general assent of the medical delegates assembled at Paris, at the instance of the French government, from the chief states of Europe; an acquiescence which we hope will lead to a general reform of the present practice of quarantine.

III.—That we have examined the practice of interment abroad, as well as in this country, and have in our reports set forth the principles which, it appears to us, should be kept in view in carrying into effect an improved system of extramural sepulture; principles which, in the main, are now recognised and in course of adoption.

IV.—With reference to our ordinary duties in the execution of the Public Health Act, it will be found,

That we have laid the foundation of measures of tried efficiency against the visitation of ordinary epidemic diseases, and have proved the practicability of a great reduction in the average amount of disease and mortality

prevalent amongst the labouring classes, and of a considerable extension of the duration of their lives, and the periods of their working ability.

V.—That we have put in course of practical execution the main conclusions sanctioned by the Commissioners of Inquiry into the means of improving the Health of Towns, and embodied in the Public Health Act.

In prosecuting this purpose we have checked wasteful outlays, which frequently only aggravated existing evils, and put in course of extensive and successful practice permanent works for an improved water supply, combined with those for an improved system of self-cleansing town drainage, together with those for paving and flagging, under one and the same local management; yet subject to such general control as has been deemed by the Legislature necessary to check wasteful expenditure, and to give due protection to minorities and unrepresented persons.

With reference to the improvements introduced into the supply of water, they consist chiefly in its collection from natural or artificial shallow springs, and in its delivery direct from its source so as to need no filtration; dispensing with cisterns, and, wheresoever practicable, avoiding storage in uncovered reservoirs, and finally distributing it in a fresh and pure condition to the lower class of houses at a cost not exceeding one penny, or on an average one penny half-penny per week per house. (*See Conclusions of Report on Supply of Water to the Metropolis, and table of returns in relation to the new water-works provided. App. Nos. 5 and 6.*)

We have promoted the introduction of systematic works for the constant removal of house and town refuse before it can enter into decomposition, and at from one-third to one-fourth the expense hitherto incurred for the construction and cleansing of cesspools, house drains and sewers of deposit, that aggravate the evils which proper works should remedy. (*See Conclusions from Minutes of Information on the Drainage of Houses and Towns, circulated for the use of Local Boards, App. No. 7.*)

We have promoted the application of improved measures for the drainage of the uncovered, or suburban portions of the area under the jurisdiction of Local Boards of health, in such a manner as to give greater facilities for private land drainage. (*Vide Conclusions in Minutes of Information on Suburban Land Drainage, App. No. 8.*)

We have provided for the systematic application of the sewerage of towns to agricultural production, by improved methods of pipe distribution; obviating the sanitary evils, and avoiding the waste of distribution by water meadows; improved methods which are in course of voluntary adoption by scientific agriculturists for the distribution of farm yard manures. (*See Conclusions from the Minutes of Information on the Application of the Sewerage of towns to Agricultural Production, App. No. 9.*)

VI.—For the promotion of the objects of the Public Health Act, we have selected engineering officers of special qualifications, (*vide App. No. 10, on Tests for Examination as to Qualification,*) and given them special instructions. The specially qualified services of these officers have been available for other public departments. (*See Instructional Letter for the Examination of Candidates, App. No. 11.*)

VII.—The confidence placed in the Board is indicated by the fact that they have been requested by thirty Town Councils, or Local Boards, to name engineers for the execution of their local works; by eleven others to examine the qualification of candidates for town surveyorship, and by several more to provide local officers, and fix the salaries which should be given to them, and to arbitrate on various questions in dispute.

VIII.—The improved form of Local Acts by provisional orders, is applicable to large classes of Local Private Acts, and effected at from one tenth to one twentieth the expense heretofore incurred for them.

IX.—In consequence of thus cheapening and facilitating the procedure for obtaining legislative sanction, out of two hundred and eighty-four petitions, the total number received for the application of the Public Health Act, measures for the consolidation of old works, or the erection of new ones, contemplated by the Act, have been applied to one hundred and eighty-two cities, towns, and places, comprehending more than two millions of town population. New surveys are completed in one hundred and twenty-six of the places to which the Act has been applied plans have been examined and sanctioned for sixty others which are in course of execution, and works have been completed in thirteen. In forty other towns and places proceedings are in due course upon petition for the application of the Act, twenty-two of such petitions having been presented since September last (to Dec. 31, 1853).

X.—In consequence of the administrative improvements effected under the Public Health Act, public works have been executed by local authorities, more efficiently and economically, as well as more responsibly and satisfactorily to the public, than had heretofore been done by uncontrolled local authorities, or by trading companies.

This has been effected by keeping in view what is deemed the proper position and principle of action of a General Board :—

“First, as a responsible agency for the removal of those evils in the repression of which the public at large have an interest.

“Next, as an authority for appeal in disputes between conflicting local interests.

“Thirdly, as a security for the due distribution of local charges, for the protection of minorities and absentees, against wasteful works, or undue charges ; and—

“Fourthly, as a means of communicating to each locality, for its guidance, the principles deduced from the experience of all other places from which information may be obtainable.”

Experience has shown, particularly that of recent occurrences at Luton, Newcastle, Gateshead, and Merthyr Tydvil, that large majorities of the labouring classes being weekly occupiers, and unrepresented, and having, therefore, no direct influence on local authorities charged with the execution of preventive measures, even when they have votes, from their state of ignorance are easily misled as to their own interests ; circumstances which give this class the strongest claim to an appeal to a body capable of affording them the protection intended by the Act, and invested with full and responsible powers for affording such protection.

XI.—We have so promoted the execution of permanent works, to be defrayed by payments distributed over periods of time, as to prevent the injustice and inconvenience to large classes, occasioned by the execution of such works by immediate levies ; but,—

The successful completion of the works already commenced, and of those in preparation, and further improvements in this new and untrodden field of public administration, will depend on the security taken for the strict and responsible performance of this branch of service, by competent, sustained and zealous attention, in ensuring efficiency and preventing waste.

On the successful completion and action of the works, in the places to which the Public Health Act is already applied, will mainly depend its extension to other towns and cities, and its adoption in other parts of the kingdom.

We trust that on a due examination of the extent of business transacted, (including that prepared, but the execution of which has been delayed or prevented,) and on consideration of the cost incurred, it will be found that in economy and efficiency what we have done will bear comparison with the transaction of business in private professions and trades. (*See Return of the Amount of Business transacted and the Total Annual Expense, App. No. 12.*)

With reference to the Nuisances Removal and Diseases Prevention Act, the alterations required to render it efficient were submitted immediately after the termination of the last epidemic, chiefly at the instance of local authorities, and a promise was made that amendments should be proposed.

It was however then anticipated by some, that epidemic cholera had disappeared for another term of years as large as that which intervened between the preceding visitations; but the increased frequency of its recurrence at its sources in India, and its devastations in Persia, Russia, and Poland, forbade that expectation on our part, and the circumstances under which it has now reappeared, warrant the belief that the infliction will be renewed with greater severity and probably with greater frequency.

For such emergencies, and still more to meet the ravages of common epidemics,—against which house-to-house visitation, and prompt treatment of the early symptoms promise to be as efficacious as against cholera—the application of the powers of the Act immediately on the appearance of the disease, is absolutely necessary without the intervention of any other forms than the proof of the reality of the attack.

The Public Health Act gives power to Local Boards to compel owners to supply houses with water, where it may be done for a rate not exceeding two-pence per week. They have also the power to compel house drains to be made, and to order the removal of cesspools. But it has been found that the exercise of the power for the removal of these sources of disease is, in the worst cases, often effectually obstructed by the lowest class of landlords.

The officers of Local Boards, and many Local Boards themselves would now be prepared for the exercise of a compulsory power by the General Board in such cases; which would meet with little resistance if the provision of proper self-cleansing house drains could be carried into effect, as it certainly might, at a rate not exceeding the water rate; namely, two-pence per week.

The other powers needed under the Public Health Act, the particulars of which have been elsewhere submitted, relate chiefly to the working clauses, and consist for the most part of additional powers of action for local boards. Among such additional provisions, the most important for many of the new boards would be the powers required for the collection of springs of water for the public water supply beyond the jurisdiction of local boards; and also facilities for the application of sewerage manure to lands.

We anticipate that when the works now in progress for combined water supply and drainage, and for the application of refuse to agricultural purposes, shall have been completed, which may be confidently anticipated with respect to about fifty towns in the course of a year, or a year and a half, the trained service now organized, as well as the functions of the Board itself, will admit of considerable change.

But what we apprehend requires for the present to be most anxiously guarded against is the interruption of the works now in course of completion; the inadvertent omission of parts essential to the working of the combined whole; the neglect of the evidence which the more advanced works are now beginning to afford of the diminution of the entire class of epidemic diseases, proportioned to the removal of their localizing causes; the rendering useless correct and efficient plans already prepared; and the greater or less waste in an amount of public expenditure which cannot be estimated at less than four millions and a half.

We beg further to express our conviction that the information which we have been enabled to diffuse respecting the principles and objects of the Public Health Act, and the evidence on which its provisions and anticipations are founded, has produced among local authorities a growing sense of its importance as the great means of effecting the sanitary improvement of the country. We deem it highly satisfactory that it has been so seldom necessary to use the compulsory powers of the Act. In

whatever we have ourselves ventured to recommend, we have studiously endeavoured to carry the convictions of Local Boards with us; and, except in the instances above stated and explained, we hope we have been successful. We have reason to believe that many large towns and cities, not yet under the Act, are watching, with immediate reference to their own course of proceeding, the results of the measures which are now coming into operation. We know that the efforts made in this country to improve the sanitary condition of the great masses of the people, have attracted the earnest attention of other countries. Our published reports have been translated and widely circulated on the Continent; commissioners have been sent to us to make inquiries into the whole of the circumstances connected with the works in progress, and their prospective results, for the information of the Governments of France, Belgium, Denmark and Sweden. Our proceedings have engaged the attention of the Piedmontese Government and the municipality of Turin. We have also received official communications from Warsaw, Berlin, Vienna, and several of the American States, as well as from the West India Colonies, and we feel assured that on the legislative measures which may be taken in the present stage of the working of the Public Health Act, to amend its defects and to confirm its powers, will mainly depend the further progress of Sanitary Reform, and the removal of the great and admitted evils which result from its neglect.

We have the honour to be,

My Lord,

Your Lordship's

Most obedient servants,

SHAFTESBURY,

EDWIN CHADWICK,

T. SOUTHWOOD SMITH.

The Right Honourable

Viscount Palmerston, G.C.B., M.P.,

&c. &c. &c.

APPENDIX.

- No. 1. Conclusions obtained with respect to Cholera.
 - No. 2. Conclusions obtained with respect to Yellow Fever.
 - No. 3. Conclusions obtained with respect to Quarantine.
 - No. 4. Conclusions obtained as to Metropolitan and Suburban Interments.
 - 1. Metropolitan Interments.
 - 2. Extramural Interments in Country Towns.
 - No. 5. Conclusions obtained on Water Supply.
 - No. 6. Table of comparative Results obtainable from new and old Modes of Water Supply.
 - No. 7. Conclusions obtained as to House Drainage, and the Sewerage and Cleansing of Sites of Towns.
 - No. 8. Conclusions obtained as to Drainage of Suburban Lands.
 - No. 9. Conclusions obtained on application of Sewer Water and Towns Manures to Agricultural Production.
 - No. 10. Tests for the Examination of Candidates for the Office of Superintending Engineering Inspectors of the General Board of Health.
 - No. 11. Instructions of the General Board of Health to the Superintending Inspectors.
 - No. 12. Statement of the Business transacted by, and the Expenditure of, the General Board of Health, from its Foundation in 1848 to 31st December 1853.
 - No. 13. Table showing Deaths and Causes of Death in 1847.
 - No. 14. Table showing Comparison of the Cost in Life of War and Pestilence and Civil Violence.
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No. I.—CONCLUSIONS OBTAINED WITH RESPECT TO CHOLERA.

On a review of the whole of the late experience we conceive that its main results are in strict accordance with the conclusions at which the Metropolitan Sanitary Commissioners arrived from their official investigations in 1847. Before the second visitation of the pestilence had yet returned, but when the calamity appeared to be impending, from a consideration in the rise and spread of cholera in 1831, and a comparison of the circumstances which marked the severity and extent of its prevalence in the principal towns, both of Great Britain and of Europe, the Commissioners arrived at the conclusion, contrary to the view which was then commonly entertained, that the pestilence would present nothing peculiar in its course; but that it would be found to be governed by the same laws as other epidemics, and to attack in the largest numbers, and with most severity, the same classes of persons and the same places as typhus, scarlet fever, diarrhoea, and the entire class of zymotic diseases. We submit that the history of the pestilence which we have now given, relative to the persons and places that have suffered as well as to those that have been exempt, has placed this matter beyond further question.

On a consideration of the evidence which was at that time submitted to the Commissioners that the conditions which favour the origin and spread of typhus, and the other common epidemics of this country, particularly overcrowding, which year by year has gone on steadily increasing, by the increase of the population as well as by immigration, without a proportionate provision of proper habitations, or any additional means for the removal of the increased filth, necessarily consequent on augmented numbers; the congregation of great numbers of the population in all our large towns into compact masses, without fresh air and without pure water; living, many of them, over cesspools, or close on foul and overflowing privies—considering that these and other circumstances conducive to an impure condition of the atmosphere had not diminished since the former epidemic, but had materially increased, the Commissioners expressed an apprehension that the approaching epidemic would be more extensive and fatal than that of 1831. Instructed as we now are by experience as to the extent to which this apprehension has been realized, it is matter of regret that this apprehension was not at the time more forcibly urged on the attention of the Legislature. It has been already stated that the deaths in the recent have been more numerous than the recorded attacks in the former epidemic, while the attacks have been more than double; the total number of recorded deaths in England and Wales in the whole of the former epidemic being only 16,437, whereas in the single year of 1849 they amounted, including diarrhoea, to 72,180.

The terror with which the re-appearance of this disease was universally regarded at the time when its second return was expected, arose principally from the prevalent opinion that it was a sudden and uncontrollable malady, neither to be prevented nor remedied. In our first and second notifications, we made representations which appeared to us to be calculated to remove this false and pernicious popular impression, and by a large body of evidence derived from the experience of the disease in India, and in the principal towns of Europe, as well as from the experience of our own country in 1832; we endeavoured to show that, with a few exceptional cases, occurring chiefly at the first outbreak of the pestilence in a new locality, the disease gives distinct warning of its approach, in time for effectual precautions to be taken against it; and that if that time is not lost, and proper precautions are not neglected, in the immense majority of instances the malady may be stopped in its first or premonitory stage, and its progress to a fatal termination arrested. We submit that the truth of this view, which was at that time doubted even by the highest medical authorities of this country, is established by the entire body of evidence which has been detailed in the preceding pages.

It was stated in the Metropolitan Sanitary Report, that when cholera first appeared in this country, the general belief was, that the disease spreads principally, if not entirely, by communication of the infected with the healthy, and that therefore the main security of nations, cities, and individuals, consists in the isolation of the

infected from the uninfected,—a doctrine which naturally led to the enforcement of rigorous quarantine regulations; the establishment of military and police cordons; the excitement of panic; and the neglect, and often the abandonment of the sick, even by relations and friends: but that since opportunities had been obtained of a closer observation of the character of this disease, and of the mode in which it spreads through continents, nations, cities, towns, and families, facts had been ascertained which were incompatible with this view of its mode of dissemination, and of its prevention; that the disease is not in the common acceptation of the term contagious, but spreads by an atmospheric influence, its progress consisting of a succession of local outbreaks. We submit that the facts which we have now detailed relative to its progress from Asia to Europe, through the several countries of Europe, through the principal towns of Great Britain, and through the districts, streets, courts, and houses of each individual town, is in strict accordance with this view.

At the commencement of these investigations, it was believed that cholera, typhus, and other epidemic diseases were imported; this impression being derived from the observation of the frequency of their recurrence in migratory populations, whereas we have shown in our Report on Quarantine that in overcrowded low lodging-houses, the worst of fever nests in every town, as well as in close, overcrowded, and filthy ships, the conditions being the same as in a stationary population, the results are the same; and that the tramping about from town to town in the open air, except when the strength is exhausted by fatigue, instead of increasing, tends to lessen disease.

We have elsewhere stated that whereas it was formerly believed that the most powerful predisposition to this disease is induced by deficient food and clothing, and that for this reason its chief victims are found among the destitute, or persons on the verge of pauperism, a closer observation of facts showed that, while the unfavourable influence of destitution is not to be denied, a far more powerful predisposition is the habitual respiration of an impure atmosphere; that the highest degree of susceptibility is produced where both these conditions are combined, that is, where people live irregularly, or on unsuitable diet, and at the same time filthily; and that, in places in which a great degree of cleanliness is maintained, the poor as well as the rich enjoy exemption from this disease.

We submit that the tenor of the evidence derived from recent experience affords complete confirmation of these views.

It was stated by the Metropolitan Sanitary Commissioners, that even at that time experience had sufficiently proved that the circumstances which influence the origin and spread of typhus and other epidemic diseases were generally removable by proper sanitary arrangements; that consequently typhus and its kindred diseases are to a great extent preventible, and that there was reason to believe that the spread of cholera might be prevented by the like means, namely, by general and combined sanitary arrangements.

We submit that the late experience has added to our previous knowledge of the efficiency of sanitary arrangements in checking the extension of this formidable disease. For the evidence which we have now detailed shows,—

That where combined sanitary arrangements have been carried into effect the outbreak of the pestilence has been sometimes averted;

That where its outbreak has not been prevented its course has been gradually, and in several instances suddenly, arrested;

That where material improvements have been made in the condition of the dwellings of the labouring classes there has been an entire exemption from the disease, and that where minor improvements have been introduced the attacks have been less severe and less extensive, and the mortality comparatively slight;

That with reference to the measures of prevention and alleviation which we have thought it our duty to recommend, and in the instances in which circumstances appear to require it, to enforce, the immunity from the disease has been in proportion to the extent to which those measures have been carried into effect systematically and promptly.

Upon the whole we submit that the facts and results given in this Report have placed in the hands of the Legislature, for administrative execution, measures for checking the progress and lessening the severity, if not entirely preventing the occurrence, of this pestilence; and that the measures preventive of this one epidemic, which only attacks at distant intervals some of our towns and cities, are preventive of typhus and other epidemics, some or other of which are at all times in all our towns and cities, and which produce, as a constant result, nearly as great an average mortality as the apparently more destructive pestilence on its occasional visitations.

But the chief obstacles to the general and early adoption of measures of prevention arise from the difficulty of communicating to those whom it is necessary to convince, such information as may satisfy their minds of the incomparably greater efficacy of measures of prevention than of those that are merely palliative or curative; a persuasion which is only now beginning to make a due impression on the minds, and to direct the professional inquiries even of medical men, and the full importance of which cannot therefore be expected to be at present appreciated by classes less instructed on these subjects.

The Legislature, however, has recognised the full importance of this principle, by adopting it as the fundamental one both of the Public Health Act and the Nuisances Removal and Diseases Prevention Act; and the late experience has not been wanting in pointing out where the law is defective, and what further provisions are required for fulfilling the intentions of the Legislature. We regard as one of the most important of the results of the experience which we have now endeavoured to describe, the additional ground which it affords for the expectation that material improvement in

the physical, and through the physical, in the moral and social condition of the people will result from those permanent works which, under the Public Health Act, may be effected in towns and cities; and we submit that it is, in the mean time, essential to the protection of the public life and health that adequate legislative powers should be given for dealing effectually with those extraordinary and formidable states of disease, the occasional occurrence of which must be expected, until these sanitary works have been completed and have been introduced into all the towns of the kingdom.

NO. II.—CONCLUSIONS OBTAINED WITH RESPECT TO YELLOW FEVER.

That yellow fever epidemics break out simultaneously, in different and distant towns, and in different and distant parts of the same town, often under circumstances in which communication with infected persons is impossible.

2. That yellow fever epidemics are usually preceded by the occurrence of individual or sporadic cases of the disease, which sporadic cases are likewise common in seasons when no epidemic prevails.

3. That yellow fever epidemics, though occasionally extending over large tracts of country, are more frequently limited as to the space over which they spread, often not involving the whole of a town, and sometimes not even any considerable district of it.

4. That yellow fever epidemics do not spread from district to district by any rule of gradual progression, but often ravage certain localities, while they spare entirely, or visit very lightly, others in the immediate neighbourhood, with which the inhabitants are in constant intercommunication.

5. That yellow fever epidemics, when they invade a district, do not spread from the houses first infected to the next, and thence to the adjoining, and thus extend as from a centre; but, on the contrary, are often strictly confined to particular houses in a street, to particular houses on one side of a street, to particular rooms in the same house, and often even to particular rooms on the same story.

6. That in general, when yellow fever breaks out in a family, only one or two individuals are attacked; commonly the attendants on the sick escape; and when several members of a family are successively attacked, or the attendants on the sick suffer, either the epidemic was general in the locality, or the individuals attacked had gone into an infected district.

7. That when yellow fever is prevalent in a locality, the most rigid seclusion in that locality affords no protection from the disease.

8. That, on the other hand, so great is the success attending the removal from an infected locality, and the dispersion of the sick in a healthy district, that by this measure alone the further progress of an epidemic is often arrested at once.

9. That such dispersion of the sick is followed by no transmission of the disease, not even when the sick are placed in the wards of a hospital among patients labouring under other maladies.

10. That no one of the preceding facts can be reconciled with any other conclusion than that, whatever may be the exciting cause of yellow fever, it is local or endemic in its origin: and the evidence of this conclusion is therefore cumulative.

11. That the conditions which influence the localization of yellow fever are known, definite, and, to a great extent, removable; and are substantially the same as the localizing causes of cholera and of all other epidemic diseases.

12. That, as in the case of all other epidemic diseases, in proportion as these localizing causes are removed or diminished, yellow fever ceases to appear, or recurs at more distant intervals, and in milder forms.

13. That besides the common external localizing causes, there is one constitutional predisposing cause of paramount importance, namely, non-acclimatization—that is, the state of the system produced by residence in a cold climate; in other words European blood exposed to the action of tropical heat; the practical lesson being that the utmost care should be taken to prevent individuals or bodies of men, recently arrived within the yellow fever zone, from going into a district in which the disease actually exists or has recently been present.

14. That there is no evidence to prove that yellow fever has ever been imported.

15. That consequently the means of protection from yellow fever are not quarantine restrictions and sanitary cordons, but sanitary works and operations, having for their object the removal and prevention of the several localizing conditions, and when such permanent works are impracticable, the temporary removal, as far as may be possible, of the population from the infected localities.

NO III.—CONCLUSIONS OBTAINED WITH RESPECT TO QUARANTINE.

That the chief pestilence in respect to which quarantine establishments have been kept up in this country, the oriental plague, is, in its antecedent circumstances or causes, in the localities, classes, and conditions of the population attacked, in its rise and progress, a disease of the same essential character as typhus; being, according to the most recent authorities who have had practical experience of the malady, a form of that disease modified and rendered more intense by peculiarities of climate and of social condition.

That the notion of the propagation of the plague by means of goods appears from one uniform mass of evidence to be as entirely unfounded as the opinion which formerly prevailed in this country that typhus could be propagated in the same mode.

That the true danger of the propagation of plague is not by contact of the affected with the healthy, but by exposure on the part of susceptible subjects to an infected atmosphere, under the like conditions which are known to produce and propagate typhus fever in this country.

That the quarantine establishments in this country, and in every

other of which we have information, are wholly insufficient, even on the assumption on which they have hitherto been maintained, to prevent the introduction and spread of epidemic disease.

That these establishments are of a character to inflict on passengers extreme and unnecessary inconvenience, and to subject such of them as may be sick to extreme suffering and danger, while they maintain false securities in relation to the means of preventing the spread of disease.

That typhus and other dangerous epidemic diseases are frequent on board merchant-seamen vessels at sea and in port, for which no effectual or suitable provision is at present made.

That, as far as relates to the cases of epidemic disease generated at sea, the principle of the concentrating of responsibility on the shippers, in making it their pecuniary interest to complete the voyage with healthy passengers, operates most effectually in the cases where it has been applied, such as to emigrant, transport, and convict ships, and should be extended to all cases; and that in respect to ships in port, the regulations applied to the prevention of the spread of epidemic diseases from houses in towns are applicable, and would practically be highly beneficial.

That the substitution of general sanitary regulations to ships in port, for the existing quarantine regulations, would far more effectually extinguish epidemic disease, and afford better protection to the uninfected on shipboard, whilst it would relieve passengers and crews from grievous inconvenience, abate the motives to concealment of sickness and to false representations as to its nature, greatly lessen commercial expenses, and remove obstructions to the free transit of goods and uninfected persons which the existing system of quarantine occasions.

It follows that we propose the entire discontinuance of the existing quarantine establishments in this country, and the substitution of sanitary regulations.

By such substitution the most effectual security which the present state of knowledge affords would be taken against the importation of foreign contagion, the maintenance of infection, and the origin and spread of epidemic disease.

The British Parliament has legislated on the conclusion, submitted with an accumulation of demonstrable evidence, that the causes of epidemic, endemic, and contagious diseases are removable, and that the neglect on the part of the constituted authorities to remove such causes, as far as they are obviously within their control, is a punishable offence. The foundation which the Legislature has thus laid for the physical, and consequently for the moral, improvement of the people is recognised. Half a century ago it was said by a great physician and philanthropist, to whom we have already referred, that the time would come when the Legislature would punish communities for neglected the known means of preserving the public health; and that prediction the British Parliament have been the first to realize.

“To all natural evil,” says Dr. Rush, “the Author of Nature has kindly prepared an antidote. Pestilential fevers furnish no

exception to this remark. The means of preventing them are as much under the power of human reason and industry as the means of preventing the evils of lightning and common fire. I am so satisfied of the truth of this opinion, that I look for the time when our courts of law shall punish cities and villages for permitting any of the sources of malignant fever to exist within their jurisdiction."

We believe, from such information as we have been able to obtain, that the immediate adoption of the changes which we now recommend would be attended with no difficulties or inconveniences commensurate with the advantages that would accrue from the relief to commerce, the freedom of international communication, and the security of the public health.

NO. IV.—CONCLUSIONS OBTAINED AS TO EXTRAMURAL INTERMENTS.

I.—*Metropolitan Interments.*

1. That with a view to remedy the evils of intramural interment, as at present generally practised, it will be necessary to obtain separate Acts for London and the country.

2. That, after the passing of the Act for London, all interments in churches and within the precincts of the metropolis, except in special cases, under licence issued by the Metropolitan Interment Commission, should, as soon as the necessary preliminary arrangements are completed, be specially forbidden.

3. That public burial-grounds be provided at a suitable distance from the metropolis; that, with a view to prevent the near approach of the population to such burial-grounds, no new dwelling-houses be permitted within a distance proportioned to the size of the cemetery and the number of interments for which it is calculated; and that, in order to render possible the advantages of extramural interment, without, at least, enhancing the cost to the poor, to secure the proper decencies of burial, and to put an end to the injurious influence to health occasioned by the careless and unchecked disposal of bodies—it be, with the exceptions above referred to, unlawful to inter in any other place than the public burial grounds within the prescribed precincts.

4. That, considering the river as a highway passing through the largest extent of densely-peopled districts, the facilities for establishing houses of reception on its banks, the conveniences arising from the shorter distance within the larger portions of the same area for the removal of the bodies to such houses of reception, the advantages of steam-boat conveyance over that by railway in respect to tranquillity, and the avoidance of any large number of funerals at any one point at any one time, and of any interference with common traffic, and with the throng of streets; and, lastly, taking into account its great comparative cheapness, it is desirable that the chief metropolitan cemetery should be in some eligible situation accessible by water-carriage.

5. That it be unlawful to inter in any burial-ground more than one corpse in one grave.

6. That the price of funerals be regulated according to a series of scales or classes; and that the whole expense of each funeral be included in the charge fixed for its class, and be paid for in one sum.

7. That, it being essential to the success of the proposed improved practice of interment that it be administered on one system, under one responsible authority,—all public burial-grounds and the whole arrangement for burial be entrusted by commission to a small body, not exceeding five, of whom not less than one should be paid, specially qualified and responsible.

8. That in every cemetery there be a part consecrated and a part unconsecrated, and that in the consecrated part there be erected a church adapted to the purpose, and fitted also for full services according to the doctrine and discipline of the Church of England; and that in the unconsecrated part there be erected a commodious chapel.

9. That the new consecrated grounds be under the same ecclesiastical jurisdiction in matters spiritual, and in respect to the performance of the service and the superintendence of the chaplains, as the parochial burial-grounds for which they are to serve as substitutes now are; that the inhabitants retain the same right of sepulture as they would have had in their respective burial-grounds, subject to the general provisions which may be necessary for the public health and the convenience of sepulture; and that the incumbents have the right of performing the burial-service for any of their parishioners in the public cemetery, subject to the regulations established for the same.

10. That inasmuch as the fees and voluntary offerings paid to the clergy constitute one of the least of the charges incident to interment, and at the same time form in some instances almost the whole, and in many instances the greater part, of the funds on which they have been accustomed to rely, provision be made for compensation to the benefice, on account of the receipt of fees for interments, on the average of three years before the passing of the Act.

11. That compensation be made to the proprietors of private burial-grounds and to holders of cemeteries established by Act of Parliament according to the awards of juries.

12. That provision be made for placing the existing burial-grounds under such regulations as may be most conducive to the public health and advantage.

13. That although, if the whole work were to be done afresh for the first time, one part of a general scheme of extramural cemeteries would have included the formation of a corresponding set of intramural officers to receive orders, to give instructions, to collect and enforce payments, and to transact other general business, yet, to avoid the unnecessary creation of new offices, it be provided that the present parish clerks and sextons, or both, as the case may be, should be retained, and their offices made use of for maintaining the parochial connexion with the cemeteries.

14. That the whole immediate outlay for carrying into effect this scheme may be obtained without any aid from the Treasury, and without the levying of any new rate, in the following way: that is to say, by loan; the principal and interest of such loan to be defrayed out of the receipts of the cemeteries, security being given by Act of Parliament for making good from the rates whatever deficiency may occur, should there eventually be any.

There is reason, however, to believe that, along with equitable arrangements as to compensations, and even with a considerable reduction on the existing charges for interment, there will be no deficiency to be defrayed by rates.

II.—*Extramural Interments in Country Towns.*

At the conclusion of our report on a general scheme of extramural sepulchres for the metropolis, we stated the following uses which we believed would be fulfilled by its adoption:—

1. That it would put an end to intramural interments, with all its attendant evils.
2. That it would obviate any injurious effects on the public health from the practice of extramural interment.
3. That by the regulation of the price of funerals at a certain fixed scale of charges, and by the payment of the whole cost of the funeral in one sum, it would relieve families at the moment when they are the least capable of attention to such matters from care and trouble and from the possibility of extortion.
4. That by the saving of expense effected by the whole of the interments being performed on one system and under one direction, it would render the cost of burial moderate to all classes, and give to the poor the advantage of extramural interment at a reduction of the price which they at present pay for burial in the parochial graveyard.
5. That by the appointment of officers of health, and the establishment of houses of reception, it would diminish or remove the physical and moral evils which result from the long retention of the corpse in single, living, and sleeping rooms, and that thus for all these reasons it would fulfil the primary object of the change, namely, the removal of the whole of the sanitary evils which arise from the present practice of interment.
6. That it would greatly diminish the practice now so common of funeral processions in crowded streets.
7. That it would increase the solemnity and impressiveness of burial.
8. That it would elevate the celebration of the funeral rites of the poor man, and tend to remove, in respect to the services of the Church in the performance of burial, the distinction between rich and poor.

With reference to the scheme of extramural interment for county towns, on a consideration of the whole of the evidence above presented, we recommend :—

1. That as soon as proper places for extramural interment can be provided, interment within the precincts of towns should be prohibited.
2. That the preliminary expenses incident to the examination and settlement of schemes of interment, or to the employment (upon application from different localities) of an inspector of the General Board of Health, as well as the expenses of any plans of works which may be required, should be thus provided for:—In localities where a Board of Health is established, or from which petitions have issued praying that such localities may be brought under the operation of the Public Health Act, these expenses should be charged upon the general district, as provided by section 11 of the Public Health Act. In localities which are not in the position described, these preliminary expenses should be charged upon the poor rates.
3. That where a Local Board of Health is established, any such scheme of interment as is contemplated by section 12 of 12 & 13 Vict. c. 111 (the Diseases Prevention Act) may, with the concurrence of a majority of such Local Board be forthwith carried into effect by an Order in Council according to the provisions of section 10 of the Public Health Act.
4. That such an Order may authorize the Local Board to exercise any of the powers conferred upon the General Board of Health by the Metropolitan Interment Act, and may embody so much of that Act as may be suitable to the circumstances of the case, with the exception of clause 24, which forbids the establishment of any new burial ground within 200 yards of any dwelling, and which should be repealed.
5. That by such Order a scheme of interment may be framed including more places than one with the consent of such Local Board of such places, to be executed by a joint committee of such Local Boards, and with such a number of members as shall be agreed upon.
- 6 That the proposed site, plan, charges, and conditions of each district cemetery should be printed in the same manner as the reports of preliminary inquiries into the sanitary conditions of towns under the Public Health Act are now printed, and that copies thereof should be sent to the incumbents of all parish churches, and the ministers of the chapels of all religious denominations within the district to which it is intended to apply the scheme; and that one month from the date of the publication of such scheme, &c., should be allowed to intervene before it is finally sent to the General Board of Health for examination and approval.

7. That the approval by the General Board of Health of the site, plan, &c., &c., of each district cemetery should be required before such district cemetery can be used for purposes of interment.
8. That the General Board of Health be empowered to make such regulations from time to time, with reference to the mode and practice of interments in cemeteries as may be conducive to the preservation of the public health, and the decency and solemnity of burial.
9. That in all towns to which the Public Health Act shall have been applied, the Local Board of Health be the local administrative authority for the burial of the dead.
10. That in all such cases, powers be given to the Local Board of Health to establish cemeteries beyond the boundaries of the district constituted by the Public Health Act, and to compel, under the provisions of the Lands Clauses Consolidation Act, the sale of ground for the formation of cemeteries, and to make contracts for the performance of funerals.
11. That with reference to out townships, power be given to enable vestry meetings to empower churchwardens to agree with local boards on behalf of such out townships, for permission to bury in the common cemetery, and to regulate the amount of fees to be paid in such cases.
12. That power be given to a majority of the town councils of towns not under the Public Health Act, and of the Commissioners of towns having Commissioners only, to petition the General Board of Health for the application of the proposed Act, which should contain provision for the creation of a local administrative body for its execution.
13. That in like manner power be given to the vestries, boards of guardians, and churchwardens of towns which have neither town councils nor commissioners to petition the General Board of Health for the application of the Act.
14. That in all cases where land shall be required by the General Board of Health for cemeteries, under the Metropolitan Interment Act, as well as in all cases where Local Boards of Health shall require lands for the formation of cemeteries, and where the owners of such lands shall, on the service of the notice required by Section 18 of the Lands Clauses Consolidation Act, either neglect to treat for the purchase of the same, or shall not agree in the premises, the General Board of Health or the Local Board of Health, as the case may be, be empowered to summon a jury to assess and award the amount of compensation payable to the parties interested in such land, according to the provisions of Section 22 of an Act intituled "An Act to empower the Commissioners of Her Majesty's Woods, to form a Royal Park in Battersea Fields, in the county of Surrey," 9 & 10 Vict. c. 38.
15. That after the formation of burial districts, it shall be unlawful for any person to perform any funerals therein without the sanction of the proper authority.

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16. That Local Boards of Health be empowered to make equitable arrangements as to compensation, on the principle of the Metropolitan Interment Act, the awards of such Boards in cases of dispute being liable to revision by the Lords Commissioners of Her Majesty's Treasury.
17. That the local authorities be empowered to borrow the funds for the purchase and construction of cemeteries on the security of the public rates, with the sanction of the General Board of Health, to be repaid by annual instalments out of the fees arising from interments in a period not exceeding thirty years.

No. V.—CONCLUSIONS OBTAINED ON THE SUPPLY OF WATER TO THE METROPOLIS.

Having directed our medical and engineering inspectors to inquire, as closely as the time would permit, into the state of the water supplies of the metropolis; having through them consulted the most recent practical experience of other districts where new supplies of water improved in quality and distribution have been introduced; and having taken an extensive body of evidence thereon, we find, as relates to the quality of the water of the river Thames—

1. That for domestic use it is inferior to the average quality of waters supplied to towns.

2. That its inferiority as a supply for domestic use arises chiefly from an excess of hardness.

3. That even when taken above the reach of pollution from the sewers of the metropolis, it contains an excess, varying with the season, of animal and vegetable matter:

4. That although this latter cause of inferiority may be in part removed or corrected by filtration, the excess of hardness will still remain, rendering this water especially unfit for the following uses, namely, for cleansing the skin, and for the ordinary purposes of washing, by occasioning an excessive consumption of soap; for the preparation of tea, by occasioning waste to the like extent; and for all culinary processes by diminishing their efficiency and increasing their expense.

5. That the quality of the water of the river Lea and of the New River is, in this respect, no better than that of the Thames water taken beyond the influence of the sewage of the metropolis:

6. That the water taken by the Lambeth Company from the Thames opposite Hungerford Market is charged with animal and vegetable impurities, apparently the effect of the discharge of sewer water, which render it wholly unfit for use, and highly dangerous to the health of the persons who drink it.

7. That of the seven principal Companies by which pipe water is conveyed to the metropolis, four deliver it without previous filtration.

8. That the defects in the quality of the water at present supplied, when collected in its least objectionable condition, and

the evils arising from its distribution in the unfiltered state, are all aggravated by the practice of intermittent distribution.

9. That the practice of intermittent distribution occasions, in the case of the better description of houses, the retention of the water in cisterns and butts, and, in that of the poorest classes, in tubs, pitchers, and such other vessels as can be obtained; and, as a consequence of such retention, the water imbibes soot and dirt, and absorbs the polluted air of the town, and of the offensively close, crowded, and unhealthy localities and rooms in which the poor reside.

10. That from the inferiority of the water at its source as at present collected, and from the additional pollution and deterioration occasioned by the mode of its distribution, a large proportion of the population is rendered averse to the daily use of water as a beverage, and is inclined and almost forced to the use of fermented liquors and ardent spirits to an extent greatly beyond the consumption of such drinks where purer water is more accessible :

11. That the annual cost of the construction and maintenance in repair of cisterns and their supports and connected apparatus in the houses of the middle and wealthier classes, often exceeds the annual water-rate :

12. That the cost of the pipe water supply, and the additional expense and inconvenience resulting from the present mode of its distribution, cause the population in some suburban districts to resort for water to open ditches, and in other crowded localities to shallow springs or wells ; sources which are subject to increasing pollution from cesspools, from badly constructed house-drains and sewers, and from overcrowded grave-yards :

13. That the localization and intensity of cholera in such districts as those alluded to was promoted in a most marked manner by the use of water containing decomposing animal and vegetable matter, derived from sewers, drains, and other impure sources :

14. That the districts most severely visited by epidemic cholera, as well as those most afflicted by ordinary epidemic diseases, are low-lying districts, where, from the defective state of the drainage, there is an excess of damp and of putrid decomposition ; and that such excess of damp is aggravated by the waste of water attendant on the intermittent mode of supply ; a waste which appears to exceed the whole of the annual rainfall on the inhabited area of the metropolis.

Many practical difficulties having been urged against the substitution of the constant for the intermittent system of water supply in the metropolis, we have particularly examined into the working of the constant system in towns where it is established, and in some of which it has been in operation for 15 and 20 years, and we find—

15. That the waste of water is so far less instead of greater under the system of constant supply, that although the inhabitants have unlimited command of water, and use what they please,

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though the actual use of water by the inhabitants is greater, the quantity delivered by the Companies is less, frequently less by one-half, in consequence of there being less waste from the more perfect delivery :

16. That the water, under the system of constant supply, is delivered purer and fresher, of a lower temperature in summer, and that it is less subject to frost in winter :

17. That the inconveniences apprehended from the interruption of supply during repairs and alterations are never experienced, the work being executed under such simple precautions that no complaint has ever been known to have been made on this account :

18. That the interruptions of supply which are so constantly experienced on the intermittent system from the waste in the lower districts, from the neglect of turncocks, from limitation of quantity, from inadequate or leaky butts and cisterns, or from deranged ballcocks, are scarcely ever known on the constant system :

19. That the system of constant supply admits of great economy in pipes, as they may, under that system, for the most part, be considerably smaller, and not being subject to the violent hydraulic jerks of the intermittent system are less liable to burst :

20. That the pipes for the house service may not only be considerably smaller and cheaper, but that the cisterns and apparatus connected therewith, which, in the smaller class of houses, now cost more than the whole public portion of the works, may be entirely dispensed with.

In respect to the quantity of water actually supplied, and to the quantity needed for the domestic use of the metropolitan population, and for other purposes, we have to report—

That in consequence of statements made by several of the Companies of the quantities of water which they pumped for the use of the metropolis, quantities which appeared to be inconsistent with the known habits of the population and the apparent amount of water consumed for domestic purposes, we deemed it desirable to cause the consumption of water in different districts, by different classes of the population, to be gauged from the cisterns and butts, and also the run through house-drains and sewers on days when there was no rainfall.

From these observations it appears,

21. That—whereas it was returned, in 1832, that the average quantity of water delivered to their respective customers by the several Companies was 220 gallons per house or dwelling; and more recently, as returned to us, was stated to be 164 gallons per house or dwelling; that is, 44 millions of gallons per diem for the whole of the metropolis—making allowances for a considerable and injurious waste of water by permeation through badly constructed channels, the results of the gaugings of the run of water through drains and sewers, on days when there is no rainfall, do not appear materially to differ from the later statements of the

several Companies as to the quantity of water which is actually pumped into their several districts; while from the gaugings of the quantities of water consumed from cisterns and butts during the intervals of the intermittent delivery, and from the capacity of the storage receptacles themselves, it appears that the average daily consumption does not exceed five gallons per head on the population; and that, with all allowances for the quantities used for manufactures, steam-engines, and other purposes, the gross quantity consumed does not exceed one-half of the quantity delivered:

22. That this waste is a consequence of the present intermittent mode of supply, and does not take place to any such extent where the constant system of supply has been substituted; and probably may be prevented altogether where the house service-pipes are properly provided and arranged under a system of combined works:

23. That this waste, as now ascertained by official investigation, appears to have gone on without any knowledge of its great amount on the part of the Companies, although it involves a double expense of pumping, and exceeds, as above stated, the whole of the annual rainfall on the covered area of the metropolis:

24. That this waste is of no equivalent benefit for the cleansing of house drains and sewers, inasmuch as, from the inaptitude of these works, owing to their bad construction, for the discharge of water containing matter in suspension, accumulations of decomposing matters do take place in them, to the great injury of the public health; accumulations which, notwithstanding the flow of the waste water through them, required to be cleared away by hand-labour, by flushing, or by other means:

25. That the waste water, having sewer matter mixed up with it, permeates through the brick drains and sewers, saturates the sites of houses with polluted water, and keeps up an excess of moisture, which, rising into the porous and absorbent walls and plaster of the houses, contributes to render them damp even in the driest weather:

26. That this excess of moisture is aggravated by the extremely defective drainage in the low-lying and worst-conditioned districts, where, as has been already stated, epidemic disease is almost invariably present, and where the recent visitation of epidemic cholera has been the most severe:

27. That, taking into consideration the actual domestic consumption of water by the population of the metropolis, regarding also the extent of the increased supplies needed for various purposes of sanitary improvement not hitherto contemplated by Companies, nor included in new schemes, all the engineering estimates put forward by private Companies of the quantity of water required for the service of the population appear to be greatly in excess:

28. That there appears no probable demand for a general average consumption of water exceeding the present rate for houses of the higher class, namely, about 75 gallons per house per diem, or in all

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22 millions of gallons per diem, inclusive of the increased supply which will be necessary on the abolition of cesspools; and that, estimating the additional requirements for baths, for street cleansing, for large consumers, for fires, and for other purposes, the whole quantity of water needed under an improved system of distribution does not exceed 40 millions of gallons per diem:

29. That it appears that the resolutions of parochial meetings and the statements of the promoters of new Companies, alleging a deficiency in the total amount of water already introduced, and proposing to bring in additional supplies, have been made in ignorance of the actual present domestic consumption of the population, and of what is really needed, according to the best information, for the execution of practical measures of sanitary improvement.

30. That the several schemes which propose to bring in more water in addition to the quantity now wasted, and to make such additions mainly from the same sources which supply the water now generally consumed, without reference to improvements in the system of domestic distribution, and without combination with improved drainage-works for the removal of the waste water, would aggravate the existing sanitary evils, and increase the excessive charges already incurred for defective works constructed in ignorance.

Having particularly examined the statements as to the increased quantities of water required for the flushing of drains and sewers, and the working of an improved system of drainage, we find,

31. That upon a system of drainage such as that at present in use, consisting of brick house-drains and sewers which cause accumulations of decomposing deposit, there would be required, for the intermittent removal of those accumulations by flushing, considerable additions to the present quantities of pipe water pumped in for the supply of the metropolis, but that any system of house or main drainage which occasions the accumulation of decomposing refuse, and renders necessary the continuance of the practice of intermittent flushing, is in itself highly injurious to the public health, and ought to be prevented.

32. That recent trial-works have placed beyond doubt the soundness of the conclusion of the Metropolitan Sanitary Commissioners; namely, that systematically adjusted tubular house-drains and sewers are kept clear of deposit by the force of the soil or sewer water alone, when conducted away at proper levels; and that no addition of water is required for this purpose.

With reference to those extensive districts of the metropolis, the levels of which are below high-water mark, where the sewer water is at present penned up until it can be discharged at low water, and where putrefying deposit is accumulated in the sewers in consequence of the flow being arrested during high water, it appears,—

33. That it will require no addition of water, and certainly no increased expense in pumping, to cause such a continuous flow of the waste water as will prevent deposit; and that this prevention

of deposit is the true object to be aimed at, and not the supply of additional quantities of water to remove, by flushing deposit which ought not to have been allowed to accumulate.

34. That besides the great injury to the public health from the ponding up of sewer-water and the consequent conversion of large sewers and reservoirs into extended cesspools; and besides the waste of water and the expense of pumping it into the district for the removal of accumulations, the intermittent system of draining the districts below high water mark by gravitation, without the aid of pumping for their relief, must necessitate the continued pollution of the Thames, and obstruct or delay the application of the refuse as manure.

35. That, except in extreme cases of absolute deficiency, the pumping in of additional supplies of water, before properly constructed house drains are laid down for its removal, would, by increasing damp, still further deteriorate the sanitary condition of the population, and occasion still greater dilapidations and injury to tenements.

36. That the separation of works of pipe-water supply from those for the removal of waste water occasions delay in the execution of works of primary importance for sanitary improvements, as well as increased expense.

37. That it appears that while the expense of sewers and drains is reduced by an improved tubular system of drainage, the expense of earth-work, of digging and of making good, is one-half of the total expense, and that, therefore, the separate laying down of water-mains and drainage-mains must frequently cause this last portion of the expense to be materially increased.

38. That on these grounds, and on the principles already recognised, the only way of securing systematic works with economy and efficiency, as well as with the least delay, will be to consolidate under one and the same public management, the whole works for the supply of water, and for the drainage of the metropolis.

39. That it is essential to the economy and efficiency of all such works that the whole distributory apparatus, small as well as large service pipes, and house drains, together with water-mains, public drains and sewers, should be laid down under one system, and kept in action under one supervision.

40. That it appears from the examination of improved works which have been in operation for a sufficient length of time to test their efficacy, and from detailed estimates made by different competent engineering officers upon house-to-house examinations of the worst-conditioned districts, that combined works, comprising a water-pipe for the service of each house, a sink, a drain, and waste-pipe, and a soil-pan or water-closet apparatus, may be laid down and maintained in action at a cost not exceeding on the average three-halfpence per week, or less than half the average expense of cleansing the cesspool for any single tenement.

41. That the general survey being now sufficiently advanced, such works may be executed for separate districts, without waiting for the completion of any general measure or plan of main sewers.

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Having considered the evidence in relation to the qualities of the water requisite for the supply of the metropolis, we find:—

42. That in addition to the properties of clearness and freedom from animal and vegetable matter, which is apt to pass into decomposition and to prove injurious to health, one of the most essential properties of water is *softness*, or freedom from lime and other substances productive of what is termed hardness:

43. That having made careful and extensive inquiries, with the aid of the Department of the Ordnance Geological Survey, as to the most suitable sources of supply, having had those districts which appeared to be the most eligible specially examined by our engineering inspectors, with other aid, we find upon their unanimous testimony that, from a tract of upwards of 150 square miles of gathering ground, there is derivable a supply nearly double the present actual domestic consumption, of a quality varying from one-tenth to one-third the hardness of Thames water, and of a purity equalling the general average of the improved soft water supplies of the districts which have yet been brought under examination:

44. That water obtained from silicious sands, such as those which cover the tract above described is proved to be a quality only equalled in excellence by the water derived from mountain granite rocks, or slate rocks or other surfaces of the primitive formations:

45. That upon the best estimates which have been obtained, this water may be brought to the metropolis, and delivered pure and filtered into each house, on the system of constant supply at high pressure; and, at the same time, on the plan of combined works, the waste water may be removed by a proper system of drainage, at a rate not exceeding an average of 3*d.* or 4*d.* per week per house, or from 30 to 50 per cent. less than the present charges for defective water supply alone:

46. That the saving in soap, from the use of soft water, in the operation of washing (the expense of washing linen and other clothes being estimated, at an average of 1*s.* per head per week, to be nearly 5,000,000*l.* per annum on the population of the metropolis) would be probably equivalent to the whole of the money expended at present in the water-supply:

47. That the saving in tea from the use of soft water may be estimated at about one-third of the tea consumed in the metropolis:

48. That other culinary operations would be much facilitated by the use of soft water:

49. That soft water is peculiarly suitable for baths as well as for washing:

50. That the soft water would prevent those incrustations and deposits in boilers and pipes, which render hard water unsuitable for manufacturing purposes.

We therefore advise the rejection of all the schemes promoted by water companies or by parochial vestries and associations, which adopt, as sources of supply, the Thames and its tributaries of the

same degree of hardness, wells, and springs from the chalk or other formations which impart the quality of hardness :

And further, whilst we believe that Thames water, taken up beyond the influence of the metropolitan drainage, and filtered, may be used without injury to the public health, and may be employed temporarily until other sources can be laid under contribution, we advise that Thames water, and other water of like quality, as to hardness, be as early as practicable abandoned.

In respect to the existing companies which have no property in any of the sources of water supply, but whose capital is invested in engines and distributory apparatus, we recommend that their plants should be purchased, but we are not prepared to recommend any pre-appointed terms of purchase ; and we find—

51. That, if the management of the water-supply be consolidated, five if not six out of the seven principal pumping establishments may be discontinued, and an expenditure of from 80,000*l.* to 100,000*l.* per annum saved by consolidating the management of these works and connecting them with combined works of drainage and sewerage, and that further reductions may be made in the expenses of these latter establishments.

Having considered, as required under the Metropolitan Sanitary Commission, the means of supplying water to extinguish fires, and having examined the practical experience of improved works in relation therein to other towns, we find—

52. That the inadequacy of the supplies of water under the intermittent system occasions great danger to life and property ; but that by arrangements which are practicable under a system of constant supply at high pressure, the whole force of the water in the mains may be brought to bear at any point for extinguishing fires in from one to five minutes, or in about one-fourth the time that it takes the best appointed fire engines now to gain the spot and be in action after the alarm of fire has been given :

53. That, judging from the experience of various places where improved arrangements have been put in practice, it appears that by the general adoption of these arrangements more than two-thirds of the fires which now occur in the metropolis may be extinguished, before any extensive damage takes place :

54. That the insurance risks on life and property may be diminished in a yet greater proportion :

55. That the crime of incendiarism may be checked, and that these consequences alone, were there no other advantages to be obtained, would render it worth while to make the change from the intermittent to the constant system :

56. That these advantages may be best given by the same means by which a more perfect and cheaper surface cleansing of courts, alleys, foot pavements, and carriage ways than that by hand may be effected, namely, by jets of water distributed under high pressure.

Having considered the most eligible administrative provisions for the execution of the required works, we concur in the principles recommended by the Commission of Inquiry as to the best means

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of Improving the Health of Towns, and confirmed by Parliament in the Public Health Act, viz :

57. That the works of water supply, and those for drainage, or the removal of soil or waste water, should be carried into effect by one and the same administrative body :

58. But that the magnitude of the metropolis, the diversity of its local jurisdictions, and its position as the seat of Government, and the occasional residence of persons from all parts of the empire, the large minorities requiring protection, and the unaccustomed magnitude of the requisite outlay, render distinct and special provisions necessary for it, and that the amendments required may be most speedily, safely, and economically executed by special or by provisional arrangements :

59. That a general survey, under the direction of the engineers of the Board of Ordnance, and other surveys, trial works, and preparations essential to the safe and economical execution of combined works of water supply having been contemplated, under the direction of the consolidated Metropolitan Sewers' Commission, such combined works may now be executed and maintained at a lower rate of charge per house than has heretofore been incurred for any of their various branches executed separately :

60. That the initiation and executive direction of such works by members, however highly qualified, giving casual attendance at meetings held weekly or fortnightly, causes grievous delay, and that in cases in which measures for preventing disease or arresting its progress, require the utmost promptitude :

61. That considering the great loss and suffering incurred by the delay in carrying the required works into execution, it will be expedient to confide their further preparation and superintendence to a few competent and responsible officers, of whom a certain proportion should be paid, giving their whole time and attention to the subject. That the whole of these works be carried into execution by contract upon open tenders, not merely for the construction of the works, but for maintaining them in good action and repair for terms of years.

62. That the means provided by the Public Health Act for giving publicity to plans and estimates of intended works, with opportunities of suggestion and appeal, be extended to the works proposed for the sanitary improvement of the metropolis :

63. That the proper execution of the works will be best guaranteed, the responsibility of the persons charged with their execution best ensured, and the interest of the poorest classes of the population (the inhabitants of the most depressed districts, who though they pay no direct local rates pay heavy rents), will be best guarded in the special case of the metropolis, at all events provisionally, by the direct control of Parliament ; the importance of the proposed measures to the health, convenience, and comfort of large masses of the population, the magnitude of the required constructions, the amount of outlay, and the dangers of failure and waste as well as delay being, from experience of separate works already constructed, such as to render it necessary that the

highest order of continued and undivided attention and responsibility should be secured for the execution of such works as this Report recommends.

The observations already collected under the Public Health Act, of the comparative purity of different waters, appear to us to establish the axiom we have enunciated, that the shorter the space of land which water has to traverse, or the shorter the time which it remains upon it, the less will be the quantity of adventitious impurities which it will imbibe. We have had 424 different specimens of water from different parts of the country tested, and we find, that in respect to hardness, the following are the results:—

1. Wells and springs (264 specimens), average hardness, 25·86.
2. Rivers and brooks (111 specimens), average hardness, 13·05.
3. Land and surface-drainage (49 specimens), average hardness, 4·94.

The new process of land drainage furnishes a means for the filtration and depuration of impure waters on a large scale, with considerable advantages over the larger sand-strainers or common filters. The new method of relieving land from surplus surface water, by drainage *through* the land, instead of *over* the surface, besides diminishing the injury to vegetation from the lowering of temperature by surface evaporation, and rendering the soil permeable to air, and thereby facilitating the processes of decomposition and assimilation, arises from this, that the particles of organic or inorganic matter which may have been on the surface are carried down on the first fall of rain water, and lodged in the subsoil or amongst the roots, where they serve as food to the plants. On the first working of land drains—in land which has long been water-logged, there is often for a time a considerable discharge of loose matter, until the table of land drained has been brought to a good working condition. Then, where the drains have been tolerably well adjusted, the water from this deep drainage is seen running away perfectly pellucid. Where there happen to be two branch outfalls into one main, the one a branch outfall from mere surface-drained land, the other an outfall from thorough drained land, the water from the thorough drained land may be seen running perfectly limpid, whilst the water from the surface-drained land runs away turbid, and of the colour and consistency of pea-soup, from the inorganic or organic particles which it contains.

Incomplete as the investigations of this subject as yet are, still they suffice to show that the process of drainage through some soils, with or without vegetation, is capable of effecting more for the depuration of surface water than is practicable by the common sand-filters or strainers. Thus, water containing peat in solution is by reservoir filtration, only deprived of the fibrous matter held in suspension, whilst, by filtration through land, it is rendered comparatively, and sometimes perfectly, pellucid.

APPENDIX VI.

A RETURN of NEW WATER WORKS carried out under the PUBLIC HEALTH ACT; showing the Comparative Results obtainable from new and old Modes of Water Supply.

Name of Town.	Nature of the adjacent River Water.	Degrees of Hardness.	Description of the former Supply to the Inhabitants, whether from Wells or Springs.	Average Hardness of former Supplies.	Description of New Supply, whether from Land Springs or from Land Drainage Supply.	Degrees of Hardness of New Water Supply.	Whether Open Reservoir or not.	If in Action, average Daily Consumption of Water.	Average Charge for the Public per House per Week to all the Houses.	Average Public Charge to Cottages or Fourth-class Houses.
LANCASTER	-	Average, 6.50°.	Pumps and wells, in subsoil on which the town stands.	25°.	Springs from Mill-stone Grit, on the moor, at an elevation of 1,300 feet above the town. Distance from town, six miles.	Springs. 0.75°.	Covered reservoir.	Daily supply about 600,000 gallons.	1d.	3d.
ORMSKIRK	-	-	From pumps and wells.	80°.	Springs. Water pumped 130 ft. into a tank, the tank on water tower being 120 feet above the town.	Springs. 5.50°.	Covered tank.	The daily supply will be about 120,000 gallons.	Not exceeding 1½d.	1d.
HITCHIN	-	18°.	Wells, springs with pumps, and the contaminated river water.	25°.	From springs; brought in an earthenware conduit to engine-house, and pumped 100 feet high to reservoir.	Springs. 15.50°.	Covered reservoir.	The daily supply will be about 120,000 gallons.	1d.	3d.
MORPETH	-	Not known.	Old imperfect works to part of town, wells, springs, and pumps.	16°.	Springs and land drainage from the moor. Earthenware conduit to covered reservoir.	Springs. 6.50°.	Covered reservoir.	The daily supply will be about 120,000 gallons.	1-153d.	Decimal of a penny, .052.
ALNWICK	-	Not known.	Public pumps, springs, and wells.	20°.	Springs, conveyed by earthenware conduits a distance of three miles to covered reservoir.	Springs. 8°.	Covered reservoir.	The daily supply will be about 150,000 gallons.	1-153d.	Decimal of a penny, .052.
PENRITH	-	2°.	Stream from Mill-stone Eye running through the town, pumps, springs, and wells.	25°.	From filter beds connected with the river Eamont. Pumped 170 ft. (and 350 ft. for high service) by water-wheel on the river into covered reservoirs.	2°.	Covered reservoir.	The daily supply will be about 200,000 gallons.	1-90d.	1d.

ASHBY-DE-LA-ZOUCH.	No River	-	-	-	25° to 40°.	The stream of a small brook that may be called land drainage water. An alternative supply by an immense spring, but this will not be needed for a generation to come.	About 15°; the softest water within 15 miles. 26°.	Not yet ascertained.	Not yet ascertained.
BARNARD CASTLE.	The water is affected by the load flushings.	-	-	-	From 40° to 49°.	Deep springs - - - -	3°.	110,000 gallons per 24 hours.	-
CROYDON	The river was polluted with sewage.	16°.	-	-	From 13° to 43°.	Deep springs - - - -	12°.	400,000 gallons.	-
SOUTHAMPTON.	Itchen and Test. Tolerably pure.	16°.	15-6°.	-	From 3° to 18°.	Chiefly from springs. Works in progress; the result cannot be given at present.	Expected to be from 3° to 15°.	The daily supply will be about 800,000 gallons per 24 hours.	Not yet fixed.
OTTERY ST. MARY.	-	-	-	-	10° and 15°.	Land springs - - - -	12° before boiling; 3½° after.	100 gallons per house.	½d. per week.
TOTTENHAM	Lea	-	-	-	From 7½ to 39¾.	Land springs - - - -	Under 6°.	63 gallons per house.	2s. 6d. per year.
RUGEY	Avon. Derived from clay district.	15° to 18°.	-	-	Well water, very hard; some as hard as 35° to 60°.	Underground collection - -	8°.	80,000 gallons; about 13 " per head.	5-6ths of a penny.
ST. THOMAS, EXETER.	River Exe	Soft	-	-	From 12½ to 26½.	River Exe - - - -	3°.	Not known	2s. 6d. per annum.
SANDGATE	Small stream, spring fed from green sand.	18° to 20°.	-	-	Wells, varying from 16° to 32°. Water works, Undercliff, 16½°.	Artificial springs from green sand.	9° to 11°.	About 30,000 gallons.	Cottages 4s. per annum.
LAUNCESTON	A brook, tributary to the Tamar.	Almost 5°.	-	-	Wells and springs; from 4° to 14°. Water works, 1°.	Spring water - - - -	3°.	Just coming into use.	Not ascertained.

No. VII.—CONCLUSIONS OBTAINED AS TO HOUSE DRAINAGE AND THE SEWERAGE AND CLEANSING OF SITES OF TOWNS.

In addition to the conclusions set forth in the Report on the Sanitary Condition of the Labouring Population, and confirmed and adopted by the Commissioners for inquiring into the means of improving the Health of Towns, namely,—

That no population living amidst aerial impurities, arising from putrid emanations from cesspools, drains, or sewers of deposit, can be healthy, or free from the attacks of devastating epidemics; and—

That, as a primary condition of salubrity, no ordure and town refuse can be permitted to remain beneath or near habitations;—and, that by no means can remedial operations be so conveniently, economically, inoffensively, and quickly effected as by the removal of all such refuse dissolved or suspended in water; may be enumerated the following:—

That it has been subsequently proved by the results of draining houses with tubular drains, in upwards of 19,000 cases, and by the trial of more than 200 miles of pipe-sewers, that the practice of constructing large brick or stone sewers for general town drainage, which detain matters passing into them in suspension in water, which accumulate deposit, and which are made large enough for men to enter them to remove the deposit by hand-labour, without reference to the area to be drained, has been in ignorance, neglect, or perversion of the above-recited principles.

That whilst sewers so constructed are productive of great injury to the public health, by the diffusion into houses and streets of the noxious products of the decomposing matter contained in them, they are wasteful from the increased expense of their construction and repair, and from the cost of ineffectual efforts to keep them free from deposit.

That the house-drains, made as they have heretofore been of absorbent brick or stone, besides detaining substances in suspension, accumulating foul deposit, and being so permeable as to permit the escape of liquid and gaseous matters, are also false in principle, and wasteful in the expense of construction, cleansing, and repair.

That it results from the experience of works constructed upon the principles developed in these inquiries, that improved tubular house-drains and sewers of the proper sizes, inclinations, and material, detain and accumulate no deposit, emit no offensive smells, and require no additional supplies of water to keep them clear.

That, under a proper system of works for water supply combined with house and town drainage, such as is contemplated and sanctioned by the Public Health Act, no ordure is detained so long as to allow it to enter into advanced stages of decomposition, either in the house-drains or in the public sewers; but that all refuse is put in course of constant and inoffensive removal, at a rate of discharge of about three miles an hour.

That where the absence of a natural fall impedes the continuous removal of town refuse, and of surplus rain or spring water, an artificial fall may be obtained by steam power, at a rate of cost (on

a scale for a large district) which is inconsiderable compared with the evils it would obviate; and that, at such rate of cost, or from 1s. to 2s. per house per annum, in many cases, not only may the house-refuse be removed from near habitations, but the foundations of houses and the whole sites of towns may be relieved from the damp of low-lying districts, and the consequent excessive unhealthfulness and decay of habitations thereon diminished.

That all offensive smells proceeding from any works intended for house or town drainage, indicate the fact of the detention and decomposition of ordure, and afford decisive evidence of malconstruction, or of ignorant or defective arrangement.

That the method of removing refuse in suspension in water, by properly combined works, is much cheaper than that of collecting it in pits or cesspools, near or underneath houses, emptying it by hand-labour, and removing it by cartage.

That by a proper system of combined works, and properly adjusted tubular drainage, three districts at the least may, under ordinary circumstances, be drained and supplied with water completely at a rate of expense heretofore incurred in one for imperfect works, which accumulate decomposing deposits, and gave off offensive and injurious smells.

That under ordinary circumstances, where new and combined works are properly executed, the expense of the main water supplies, and the main drainage works have, on the average of the whole town, been less than at the rate of 3d. per house per week.

That where combined works have been properly constructed, a service-pipe has been introduced from the water-main for the conveyance of a constant supply of water, a sink and dust-bin provided, the cesspool filled up, and an apparatus of the nature of a water-closet substituted, connected by a house-drain with a main drain or sewer, and put in good action, at a charge under ordinary circumstances, and for the greatest number of habitations, payable by an improvement rate of little more than 3d. weekly, being less than the ordinary rates of expense for forming and keeping in repair common pumps, and the expense of cleansing cesspools attached to houses in towns.

That where combined works have been properly executed, the expense of the complete works has not hitherto exceeded the average expense of cleansing and repairing house-drains, and of cleansing cesspools, as declared upon a house-to-house inquiry, including 8,000 houses, in three average parishes of the metropolis.

That it is important, for the sake of economy, as well as for the health of the population, that the practice of the removal of refuse in suspension in water, and by combined works should be applied to all houses, especially to those occupied by the poorest classes.

VIII.—CONCLUSIONS OBTAINED AS TO THE DRAINAGE OF SUBURBAN LANDS.

1. Excess of moisture, even on lands not evidently wet, is a cause of fogs and damps.

2. Dampness serves as the medium of conveyance for any decomposing matter that may be evolved, and adds to the injurious effects of such matter in the air:—in other words, the excess of moisture may be said to increase or aggravate atmospheric impurity.

3. The evaporation of the surplus moisture lowers temperature, produces chills, and creates or aggravates the sudden and injurious changes or fluctuations of temperature by which health is injured. (*Vide* Sanitary Report 1842, pp. 80-92; Second and Third Metropolitan Sanitary Reports, and postea, pp. 66-69.)

The following are the chief agricultural advantages of land drainage to individual occupiers or owners:—

1st. By removing that excess of moisture which prevents the permeation of the soil by air, and obstructs the free assimilation of nourishing matter by the plants.

2d. By facilitating the absorption of manure by the soil, and so diminishing its loss by surface evaporation, and being washed away during heavy rains.

3d. By preventing the lowering of the temperature and the chilling of the vegetation, diminishing the effect of solar warmth not on the surface merely, but at the depth occupied by the roots of plants.

4th. By removing obstructions to the free working of the land, arising from the surface being at certain times, from excess of moisture, too soft to be worked upon, and liable to be poached by cattle.

5th. By preventing injuries to cattle or other stock, corresponding to the effects produced on human beings by marsh miasma, chills, and colds, inducing a general low state of health, and in extreme cases the rot or typhus.

6th. By diminishing damp at the foundations of houses, cattle sheds, and farm steadings, which causes their decay and dilapidation as well as discomfort and disease to inmates and cattle.

IX.—CONCLUSIONS OBTAINED ON APPLICATION OF SEWER WATER AND TOWN MANURES TO AGRICULTURAL PRODUCTION.

The general aspect and important sanitary relation of the subject are thus described in the Sanitary Report of 1842:—

“Within many of the towns we find the houses and streets
“filthy, the air foetid; disease, typhus, and other epidemics rife
“amongst the population, bringing in their train destitution, and
“the need of pecuniary as well as medical relief, all mainly arising
“from the presence of the richest materials of production, the complete absence of which would, in a great measure, restore health,
“avert the recurrence of disease, and, if properly applied, would

“promote abundance, cheapen food, and increase the demand for
“beneficial labour. Outside the afflicted districts, and at a short
“distance from them, as in the adjacent rural districts, we find the
“aspect of the country poor and thinly clad with vegetation, (except
“rushes and plants favoured by a superabundance of moisture,) the
“crops meagre, the labouring agricultural population afflicted with
“rheumatism and other maladies arising from damp and an excess
“of water, which if removed would relieve them from a cause of
“disease, and the land from an impediment to production, and if
“conveyed for the use of the town population would give that
“population the element of which they stand in peculiar need as a
“means to relieve them from that which is their own cause of
“depression, and return it for use on other land as a means of the
“highest fertility.—The fact of the existence of those evils, and that
“they are removable, is not more certain than that their removal
“would be attended by reductions of existing burdens, and might
“be rendered productive of general advantage, if due means, guided
“by science and applied by properly qualified officers, be resorted
“to.”

Later investigations of the subject have established two general conclusions applicable to the subject,—that,

IN TOWNS ALL OFFENSIVE SMELLS FROM THE DECOMPOSITION OF ANIMAL AND VEGETABLE MATTER INDICATE THE GENERATION AND PRESENCE OF THE CAUSES OF INSALUBRITY AND OF PREVENTABLE DISEASE, AT THE SAME TIME THAT THEY PROVE DEFECTIVE LOCAL ADMINISTRATION :

And correlatively that,

IN RURAL DISTRICTS ALL CONTINUOUS OFFENSIVE SMELLS FROM ANIMAL AND VEGETABLE DECOMPOSITION INDICATE PREVENTABLE LOSS OF FERTILIZING MATTER, LOSS OF MONEY, AND BAD HUSBANDRY :

As *sanitary* results of the examination of the various means in practice of collecting, removing, and applying town manures, it appears,—

1. That it is preferable to incur the total loss as manure, of ordure and urine, or of animal and vegetable refuse in towns, than to allow it to be retained for occasional removal, to putrefy and create noxious gaseous impurities, amidst or near dwellings :
2. That there have been no trials of chemical substances, as “deodorisers” or “disinfectants,” made on a large scale, which have been satisfactory as preventives ; that impurities are created before such means can be applied, and when they are applied, the labour of applying them, and the expense of the materials used, equal or exceed the proper cost of effectual arrangements for the immediate removal of all offensive matter :

3. That it is a primary condition of salubrity that all ordure or town refuse should be immediately removed from beneath or near habitations, and that this object may be the most completely as well as economically effected by removal in water:
4. That it is far less injurious to the public health to have the refuse of towns in water in the next river than underneath or amidst dwellings:
5. That the application of manures to the surface of land by means of irrigation is less injurious than the application of the same quantities of manure in the common method as top-dressings; but that the common practice of irrigation with plain water is often productive of ague, and, when conducted near dwellings, is otherwise injurious to health; and that the creation of largely extended evaporating surfaces from sewer water near towns (though still far less injurious than the retention of refuse, and its decomposition within towns and underneath habitations,) ought to be avoided:
6. That the necessity of any such exposure is avoided by the conveyance of sewer water in closed impermeable pipes underground, and by its distribution by steam power, or by gravitation, through pipes, by jets, after the method of distribution of garden watering, or by shedding from a hose, whereby the extent of exposure to evaporation is so far reduced in amount and time, and the absorption by the land so immediate, that it is, as in garden cultivation, inappreciable in its effect on the atmosphere, or on the health of persons exposed to it.

As agricultural results, it appears from these examinations:

1. That the applications of a considerable proportion of the manures of towns in the liquid form, that is to say, as sewer water, have produced heavier crops than any other known description of manure; and that the superiority of a fourfold production of grass above the ordinary growth on similar soils has been maintained for upwards of half a century by means of the application of the sewer manure near Edinburgh and Milan:
2. That the like increase of fertility has been obtained by a similar application of the common farm manures in the liquid form:
3. That the great increase of the fertilizing power of manures by their proper application in the liquid form has been displayed on various descriptions of soil, on sands as well as on clays and loams, laid down with various descriptions of arable cultivation, but more particularly with green crops, and that the quality as well as the quantity of the produce has been improved:

4. That the ordinary augmentation of produce by the full application of the fertilizing powers of liquified or liquid manures on grass land has been four and five fold above the ordinary amount of production in this country :
5. That the chief advantages of the application of manure in the liquid form consist in the economy of the manure, in the promptitude of its action, in the prevention of the loss which occurs by its drying when applied in the solid form, in the like prevention of injurious emanations while it is preserved in solution in water, and in its being better fitted for quick absorption, and more readily carried beneath the surface of the soil to the roots of plants :
6. That the method of distribution of liquid manure by steam power through fixed and flexible pipes, by jets or by shedding, is cheaper and more effectual than any other yet practised, particularly for distribution on an extensive scale and at considerable distances :
7. That this mode of distribution has great advantage over the ancient method of irrigation by means of water-meadows :—in requiring less original outlay than the particular method usually available,—requiring less water, and applying the manure with less waste and with less danger to the public health,—in not impeding pasturage, in not confining the land to one description of cultivation, and in being applicable alike to arable and grass lands :
8. That the apparatus for the distribution of liquid manure by means of steam or other power through fixed and flexible pipes will be equally applicable to the distribution of water on a large scale at a cheaper rate than by any other method yet known of supplying water to plants :
9. That by the provision of the apparatus for the distribution of the manures of towns on a large scale in the liquid form, the necessity will be avoided of any considerable outlay for machinery or fixed capital on the part of the owners or occupiers of land, previously to the adoption of the improved methods of culture consequent on the use of sewer manures :
10. That whilst the proper drainage of the land diminishes the losses arising from an excessive moisture, from continued rain or excessive floods, the apparatus of under-ground pipes, and the surface apparatus for the removal and application of sewer water or liquified substances as manure, will equally serve for the application of simple water, and for the diminution of the losses and inconveniences which are occasioned to the agriculturist by the irregular falls of rain and long-continued droughts.

The chief economical results of high cultivation, as in the examples cited, to the extent of a four or five fold produce, appear to be almost as if, for the payment of 6s. per acre of new annual

charges for pipes, the fertility of three or four additional farms were put upon one; and also as if, at the same time, the fences and gates, and length of roads to be maintained, and the distance for the transport of materials and produce in the farm, and for other purposes, were reduced to one fourth or to one fifth of the ordinary proportions. In the neighbourhood of towns the economy of space for cultivation has peculiar advantages.

X.—TESTS FOR THE EXAMINATION OF CANDIDATES FOR THE OFFICE OF SUPERINTENDING ENGINEERING INSPECTORS.

The General Board of Health have received your application for an appointment as a Superintending Inspector under the Public Health Act, with the testimonials as to your professional standing and qualifications for such an office.

In deciding upon the merits of candidates the General Board feel themselves called upon to keep in view the conclusions as to the requirements of such an office arrived at by the Sanitary Commissioners, and stated by them in the following terms:

“The more the investigation advances the more it is apparent that the progressive improvement and proper execution of this class of public works, together with the appliances of hydraulic engineering, cannot reasonably be expected to be dealt with incidentally or collaterally to ordinary occupation, or even to connected professional pursuits, but require a degree of special study which not only place them beyond the sphere of the discussion of popular administrative bodies, but beyond that of ordinary professional engineering and architectural practice.

“In justification of this conclusion, and to show the evil of the perverted application of names of high general professional authority, we might adduce examples of the most defective works which have received their sanction.

“All the improvements which the public have yet obtained in this branch of public works have been the result of the special and undivided practical attention of well-paid qualified officers.”

That the Board may be enabled to judge of the positive as well as of the relative ability of the candidates for employment in this service, they will require, in addition to the ordinary testimonials as to general ability and moral trustworthiness, to be furnished with proofs of a special aptitude for originating, expounding, and superintending the execution of the class of works in question.

In the Public Health Act you will find set down the various duties of a Superintending Inspector, and, among others, that of dealing with the owners and occupiers of districts in the way of exposition, examination, and judicial decision.

It will be evident to any one who has followed the course of the inquiries relating to public health works that the principles that have been established for future operations will render inapplicable much of the experience that has been formed in the execution of existing works of house, street, and land drainage, water supply, and general cleansing.

It is stated in the first report of the Health of Towns Commission that, "of the replies of the fifty towns on the subject of "draining and cleansing, in scarcely one place can the drainage or "sewerage be pronounced to be complete or good, while in seven "it is indifferent, and in forty-two decidedly bad, as regards the "districts inhabited by the poorer classes," and on the subject of the supply of water, that "in only six instances could the arrangements and the supplies be deemed in any comprehensive sense "good, while in thirteen they appear to be indifferent, and in "thirty-one so deficient as to be pronounced bad."

As the means of enabling the Board to judge of your application they would ask you to lay before them your views of the means of remedying these defects. To this end they would wish you to state, in the first place, the general principles which, during an inquiry and inspection of any city or town, would govern your determination of the boundaries which might be most advantageously adopted for the purposes of the Public Health Act, and then to select or suppose some case of defective house and land drainage, water supply, and cleansing, and show in detail the way in which you would treat it.

Take, for example, a small provincial town or large village, or a detached suburban district of five or six hundred houses, on an undrained heavy clay or marshy site, and it may be affected with ague or typhus.

Let the locality you fix upon be either on the borders of a river, and in whole or in part below high water mark, or on a flat ground with no river near, and state the arrangements that you would make for its thorough and perfect drainage, that is to say, for complete surface drainage, including the drainage of the land and open spaces of the neighbourhood, sub-soil drainage, and the relief from floods, especially in low lands. Reference will, of course, be required to be made to the materials, forms, sizes, and inclinations of the drains, the machinery that might be requisite, and the cost of the works.

In the next place, you would require to show how you would select, gather, store, and distribute water for domestic use, for cleansing, and for the prevention of fires, with the character and cost of the works, and also to state the principles that would guide your procedure in this important department. It will be most to the purpose to choose for this object a town with no suitable river water at hand. The qualities requisite in water to be supplied to towns, the materials to be employed in waterworks, their sizes and proportions, and the amount of supply necessary for a given population are, you are aware, all essential to be attended to.

The paving of the streets of the different classes of main and secondary streets and courts, including the materials, the method of forming the foundation, the form and inclination of the surface, with the cost of work, would also require to be given in reference to any place that you might select or suppose, and also the means you

would adopt for cleansing streets and courts, and for disposing of the refuse. The disposal of solid refuse from the habitations would likewise have to be provided for.

You will, moreover, be expected to give a very precise and detailed account of your views as to house drainage. One of the chief objects of sanitary works being the immediate removal of all decomposing refuse, soil, and waste water from, around, amidst, or beneath human habitations, it is desirable that you should fix upon a house—for example, one of the fourth class, or of the kind inhabited by the labouring population—and show by what materials, forms, sizes, and construction, and at what price, you would accomplish this object. The same ought also to be done for blocks of houses. It would be requisite to distinguish between the cases of old houses, and the applications that you would propose for new buildings or new districts.

You ought further to show by what methods you would avoid the retention of solid decomposing refuse in the neighbourhood of habitations, as well as the pollution of rivers with soil water, and at what expense you would accomplish these objects.

The Board would require to receive your exemplifications of these points in as compact a form as possible, and with such sketches and illustrations as you may think necessary for the elucidation of the subject.

It is assumed from the fact of your application that you have devoted special attention to the subjects of which a knowledge will be essentially required for the satisfactory discharge of the responsible duties of the office which you seek, and the Board consider that under such circumstances a fortnight would be sufficient time for the preparation of your answer, but the Board do not desire to restrict you to this period should you wish to have it extended.

XI.—INSTRUCTIONS OF THE GENERAL BOARD OF HEALTH TO THE SUPERINTENDING INSPECTORS.

SIR,

ON proceeding to the town to which your service is directed you will inquire for the list of places required to be made out by the 9th Order, under the Epidemic Diseases Prevention Act, where cases of typhus and other epidemic and endemic diseases have most frequently occurred. You will seek the assistance of the clergy and ministers of religion, who may be able to afford valuable aid in your inquiry, and you will also put yourself in communication with the chief medical officers and the medical practitioners, who, as union surgeons or otherwise, have probably been led most frequently into the houses and streets where epidemic diseases have prevailed.

You will request the superintendent registrar of the district to attend your first meeting with the list of the places of epidemic disease; you will also request the medical officers to attend at the same time, and also a committee or deputation of the petitioners, the surveyor, inspector of nuisances, and the high constable or other chief

officer of police, to be in attendance upon you ; you will read the Registrar-General's return of the average proportion of deaths from epidemic disease, and also the average rates of infantile mortality, and also any other such particulars as may be in your possession from previous returns with which you will have been furnished, *viz.*—the answers made to the first sanitary inquiry ; also the answers made to the inquiries of the Commissioners of Inquiry into the means of Improving the Health of Towns ; and state that you are instructed to view the places where epidemic diseases have been most rife, and to judge for yourself as to the condition of the houses, and of what may be done by public measures, and the exercise of the powers by the General Board of Health, for the remedy of the evils in question, and for the advantage of the population.

You will then ask, if there be any evil, or any place to which any person in the meeting wishes you to direct your special attention. If there be, you will take a note of it, and endeavour to attend to it as far as it may appear to require it, and as your time may enable you.

You will endeavour to confine your first meeting to the hearing of such statements, and ascertaining the parties who will give the most trustworthy information.

If there be any parties opposed to the petitioners, or to the inquiry generally, or to proceedings on the ground of expense, the objection will involve references to the condition of some places, or to the condition of the town generally ; and you must necessarily suspend your judgment until you have seen with your own eyes. After you have done so, you will judge how far it may be necessary to incur the expense or delay of a further hearing before you have made your report, when they will see what is proposed to be done, and when it is hoped that their apprehensions will be removed, and when, if not, they will have the opportunity of being heard according to Section 9. You will select the medical or the relieving officers, or other persons who will guide you to the track of fever cases, and also any town surveyor or inspector of nuisances, or officer of police, who may be required to attend you to give explanations.

From what is established in relation to the haunts of typhus and epidemic disease, it may be presumed that the list of places of their occurrence will have carried you to ill-drained and ill-cleansed and filthy places. In these places you will inquire and examine as to the state of the water supplies.

From the inspection of these places you will proceed to the other better-conditioned districts, and to the general perambulation of the town, and to the suburbs.

You will next collect your information as to the soil, subsoil, the beds of clay or strata, and the geological condition of the site of the town, its permeability and absorbency, and its state as to springs and surplus water, as affecting the state of damp, whether of tenements within the town or of lands in the suburbs.

Having taken a general view of the covered portion of the town, and of the whole site, it is to be presumed from the known common

causes of epidemic disease that you have been brought upon ill-drained and ill-cleansed districts, with accumulations of filth and cesspools in yards, or in extended cesspools constituted by ill-constructed drains and covered sewers, or by stagnant open ditches which serve as sewers, upon houses with damp floors, or walls, and upon spaces surcharged with moisture.

You will then have to consider in what way the soil and animal and vegetable matter, filth, and refuse may be most rapidly, conveniently, safely, and economically removed.

From trials of works it may be taken as demonstrated that you will find that such removal may be best effected by means of impermeable tubular drains, which will allow of no escape of noxious gases; and from their comparative smoothness, and the better adaptation of forms and concentration of the stream, will allow of the best scour and consequently the least deposit.

You will have next to consider the direction of the discharge, which usually need not be to the pollution of the nearest stream, but in the direction of agricultural demand and application for the purpose of production; but in making this provision you will consider of the discharge of the drainage into such channels as will not pollute the atmosphere of the town, but will yet serve for relief: should the early demand for it for agricultural production prove inadequate, the system of impermeable tubular drains might convey the refuse of the town through sites surcharged with surface water from the rain-fall on the uncovered spaces, or from springs, and from the percolation of upland-waters, and thus avoid adding to the noxiousness of the emanations from stagnant water charged with the common marsh impurities.

You will have to consider, together with the means of relief by the conveyance of night-soil and other refuse in tubular impermeable drains, the clearance of the table site or natural area of the town from surplus rain or spring water by means of a corresponding system of permeable agricultural tile drains, and other means, according to the position of the land; and you will have to direct your attention to the protection of low-lying districts from upland flood waters as well as from the ordinary rain-fall.

The natural drainage area usually determines itself by the line of water shed from the hill top to the river or stream, dividing the valley or the lines of water shed of a natural basin. But where a river dividing a town through the natural drainage area on each bank, might in an engineering point of view, be drained separately, yet this would require double, or weaker, or less economical establishments, clashing regulations and administrations in parts of the same town. You will find the advantages resulting from the principle of administrative consolidation exemplified in a charge delivered to a jury at a Court of Sewers at Westminster by Lord Morpeth.

You will, however, wheresoever you can, avoid going beyond existing civil boundaries for the sake of time in procedure and on other grounds. In all places where there is no corporate body, it will be desirable that you should report your views upon the best

mode of constituting the local board in conformity with the provisions of the Act as to numbers and the continuance or incorporation of any local body.

Considering the superior economy as well as the sanitary advantages of removing, as far as may be practicable, all the refuse and filth in a state of suspension in water, and the greater efficiency and economy of distributing all such matters as manure in the like suspension in water, you will next have to consider of the application of existing supplies, or of new supplies of water for these purposes, and also for domestic and manufacturing purposes and other uses.

You will have to consider of the sources of such supply, and of gathering grounds or storage grounds, for the collection, storage, and distribution of water for the purposes above specified.

The consideration of the works necessary for these purposes will lead to the determination of the natural drainage area, and also of the jurisdiction of the administrative area within which the several objects above described may be most economically and conveniently accomplished.

You will only go beyond the existing civil boundaries where there is a physical necessity for doing so, or where there will be manifest advantage to the occupiers and owners of the district included in the new jurisdiction, as well as the owners and occupiers within the existing civil jurisdictions.

Where schemes of local amendment have been proposed in relation to any place, you will see and examine the place itself, and make your own notes of what appears to be necessary to be done, and of the applicability of established principles of works, before you look at any of the schemes and plans of works which may be tendered for examination. You will bear in mind that you will not be warranted in incurring delay and expense in the examination of plans which *primâ facie* are erroneous in principle, or defective in detailed application in respect to the important subject of the application of the refuse of the town to agricultural production. It is desirable to ascertain and determine to what extent town manure is at present used by the farmers near the town? What is paid for it according to the present methods? What is the expense of hand-labour in its collection, and of cartage in its removal? and also what is the usual expense of its application as top-dressing? and what is the produce from the manure as at present applied?

You will inquire as to the state of the adjacent land for the reception of sewerage manure, as to its permeability from drainage or from the natural condition of the soil and sub-soils, and also as to any waste or common land, or public lands held under tenures, favourable to adaptation as examples of successful cultivation.

You will endeavour to make known as widely as you can, that every district will be protected by the General Board of Health from contributing more than its fair share of rates, proportioned as

nearly as may be practicable to its share of the advantages which it is hoped will be derived from the measures which you will be required to prepare.

The Reports of the Commissioners of Inquiry into the means of Improving the Health of Towns show an extent of expenditure in useless and wasteful works which may well justify apprehension as to future expenditure under the same management for the same objects. In the present depressed state of many commercial and manufacturing districts you will probably experience a great dread of any new outlay whatsoever. The Legislature, in authorizing a new expenditure, has appointed the new Board, whose agent you are, for carrying the Act into effect, for the purpose of preventing the repetition of the former insufficiency and waste.

It will be your duty, by your report, to allay, as far as may be practicable, unfounded apprehension on these heads.

You will show the description of works required, and state the charges at which it may be confidently pronounced that such works may be executed under a proper management. You will allay apprehensions of immediate outlays being required, by expounding the principle and the equity of the distribution of charges over periods of time as sanctioned by the Legislature.

You will state the weekly charges per house, and the charges per head on the population, in order that the annual rental, as well as the immediate outlay, which is to last for years, may not, as is commonly done, be fallaciously set against the daily and weekly convenience and economy.

You will moreover take care to ascertain and set forth what are really the existing charges in respect to which it is hoped the new charges will serve as means of reduction, the existing immediate charges of emptying cesspools by hand-labour and cartage; the charges of repairing defective house-drains and cleansing badly constructed sewers; the charges for the construction and repairs of pumps and wells, and of tanks and cisterns where supplies of water are only intermittent; the charges of fetching, carrying, and distributing water by hand-labour, and the charges of dilapidations of premises arising from damp and ill-drained foundations.

It is important to ascertain such existing charges, as a point of departure as well as of contrast. One mode of doing this will be by a set of house-to-house queries, such as have been distributed by the Metropolitan Commissioners of Sewers. You will exercise your discretion as to the distribution of these queries. In order to keep them within a manageable extent, you may send them to be answered by the petitioners, or you may distribute them to the occupiers of different classes of houses. You may take a block of houses of each of the chief classes, and after having ascertained the existing charges in relation to them, set forth the proposed house-drainage and other works, and show in detail the proposed new charges in relation to them.

You will also advert to the expenses of sickness and mortality. The extent of inquiry and exposition on this topic will be entirely at your own discretion.

In the event of your deciding to hold an adjourned meeting to hear any parties on any contested question, you will remind the persons applying, or the rate-payers, of the expenses incurred by any delay, and ask from what fund the prosecutors of the contested question expect payment?

You will bear in mind that your examination is mainly one as to works, or as to engineering appliances for the removal of the evils in question, and you will conduct the inquiry according to your own professional views and methods of investigation: and where you deem it necessary to examine witnesses, it will be inexpedient that you should attempt to adopt the technical procedure of the courts of law, which is instituted for the determination of questions as to matters of fact with a view to legal decisions. You alone will be responsible for all inquiries, and you only are authorized to conduct them. The statute gives no authority for incurring the expense of hearing counsel and attorneys. It will be your duty to put such questions to witnesses as may appear to be necessary. If any one wishes any questions to be put on points to be investigated, you will request him to hand them to you in writing, and you will judge of their relevancy and direct the inquiry. You will bear in mind, and state to parties, if requisite, the inutility and grievous expense of former investigations as to the necessary or comparative merits of engineering works, when conducted according to the methods adhered to by courts of law on the trial of more definite questions of fact which are put in issue in those courts.

You will also point out the privilege of appeal secured by the Legislature to parties interested by the provision, "that within a certain time, being not less than the time of such publication and deposit, written statements may be forwarded to the Board in respect to any matter contained in or omitted from the said report, or further report, or any amendment proposed to be made therein." You will give the assurance that the General Board will, to the best of their power, pay attention to all written and deliberate appeals on a matter in which their only desire and interest must be to see that no just cause of dissatisfaction prevails.

You will bear in mind, as a representative of the General Board, the general nature of its objects and position as collected from the tenor and spirit of the provisions of the Act, first, as an agency for the removal of those evils in the repression of which the public at large have an interest; next, as an authority of appeal and adjudication between rival or conflicting local interests; thirdly, as a security in the distribution of charges, for the protection of minorities and absentees against wasteful works or undue charges in respect to them; and fourthly, as a means of communication to each locality, for its guidance, of the principles deduced from the experience of all other places from which information may be obtainable.

In this last view, in respect to works, each of you will be expected to note and communicate to each other reciprocally in detail whatsoever information you may obtain.

You will keep diaries of your proceedings and accounts of your expenses, and transmit them weekly to the General Board in the forms provided.

In the diaries you will note any facts or observations that may occur to you, and that you may not deem of importance enough for a separate letter.

The Board will regard your labours with great interest, and will be glad to hear from you upon all matters that may illustrate the progress of the measure.

The Board will in general refer to you any correspondence relating to the places with which you may be charged.

APPENDIX XII.

STATEMENT

- “Of the Number of Letters and Documents received by the General Board of Health, and of the several descriptions of business transacted, and of the number of Boards held since the creation of the Board, 1848, to 31st December 1853.
- “Of the debtor and creditor account of all Monies received by the General Board of Health from any source, and of the Monies paid by them since the creation of the Board in 1848; and of the unpaid debts and liabilities of the General Board of Health, made up to the 31st day of December 1853.”
- “Of the amounts of Money repayable from Local Boards; and the net expenses of the Board of Health during each year, apart from the expenses of any service specified as extraordinary.”

RETURN showing the number of Letters and Documents received, and of the several descriptions of business transacted, and of the number of Boards held, from the formation of the Board to the 1st of January 1854.

Number of Boards held	-	-	-	-	-	1,245
Number of letters received	-	-	-	-	-	*33,148
Number of letters, &c. despatched	-	-	-	-	-	114,040

*This return is exclusive of the communications to the Board reporting the cases of cholera during the prevalence of that epidemic in 1848-9. During its worst periods, the number of returns averaged above 200 daily. The number of cases of cholera and diarrhoea coming within the cognizance of the Board may be estimated at upwards 800,000; deaths between 50,000 and 60,000. During the latter portion of the last year, 1853, cholera was again prevalent in various parts of Great Britain, the number of deaths in Scotland reported to the Board having been between 1,300 and 1,400; while in England there have been reports received of about 3,500 deaths. Upwards of 3,000 returns have also been received from pilots with respect to cases of cholera and diarrhoea on board vessels arriving at ports in Great Britain during the last four months of the year.

Representations made to the Board for assistance under the Nuisances Removal and Diseases Prevention Act, and complaints as to public nuisances - - -	2,597
Reports of medical inspectors, &c., on the condition of places where cholera had broken out, or relating to the supply of water, received and considered - -	807
Reports on plans of drainage, &c., and on other (miscellaneous) subjects by Superintending and Medical Inspectors - - - - -	425
Number of deputations from towns and districts. - -	145
Number of towns, &c., from which applications have been received for the application of the Public Health Act -	284
Number of places to which the Public Health Act, 1848, has been applied by provisional order, confirmed by Act of Parliament (exclusive of nine places for which Acts have been obtained, incorporating the Public Health Act. In other instances the Act has been incorporated in Local Acts, though no petitions had previously been presented to the Board from these places). -	86
Number of places to which Act has been applied by Order in Council - - - - -	88
Bills prepared by the Board and laid before Parliament	26
Legal opinions in answers to questions submitted by Local Boards, &c. about - - - - -	1,670
Documents issued in print by the General Board of Health, from its formation to 31st December 1853.	
General report on the execution of the Public Health Act, and Nuisances Removal Act.	
Report by Superintending Inspectors on the local examination of 243 towns (<i>exclusive</i> of reports on further inquiries in 72 towns, &c.)	
General report on quarantine. Translation of first quarantine report in French (for circulation to foreign states). Ditto in Italian (ditto).	
Second report on quarantine (yellow fever), with appendices, 1852. Translation of second quarantine report in French (for circulation to foreign states).	
Report of the Board on the epidemic cholera of 1848-9.	
Report of Appendices (Dr. Sutherland and Mr. Grainger's reports) (A) and (B).	
Report on the progress and character of the epidemic cholera prevailing in Germany in 1852; by R. D. Grainger, Esq.	
Fourteen public official notifications, giving information and directions to the officers of poor-law unions, and other local authorities in England and Scotland, on the subject of the cholera &c.	

- Eight official circulars of public documents and information directed by the Board to be printed, chiefly for the use of union medical officers, members of local boards, and others charged with the execution of the provisions and regulations issued under the authority of the Public Health Act, and Nuisances Removal Act, 1848.
- Eleven various forms of instruction, schedules, queries and returns, in reference to cholera, supplied to local registrars, medical officers of unions throughout England, Wales, and Scotland.
- Minute on the interpretation of the Nuisances Removal and Diseases Prevention Act.
- Minute of instructions (with instructional letter) on duties of local boards of health, and their officers.
- Two model maps for the survey of towns or districts, also minute of proposed surveys.
- Byelaws for regulating the business of local boards, stating the duties of officers, and containing suggestions for keeping the accounts of local boards, with exemplifications annexed.
- Minute in relation to the appointment of officer of health, under the 40th section of the Public Health Act.
- Exposition of the office and regulation of the duties of officer of health.
- Summary of experience on disease and comparative rates of mortality.
- Minutes of information collected on the practical application of sewer water and town manures to agricultural production (ordered to be printed for the use of local boards of health, and their surveyors engaged in the administration of the Public Health Act, December 1851).
- Minutes of information collected in respect to the drainage of land, roads, &c., and the facilitation of the drainage of suburban lands.
- Minutes of information collected with reference to works for the removal of soil water or drainage of dwelling houses and public edifices, and for the sewerage and cleansing of the sites of towns.
- Reports to the General Board of Health on the sanitary condition of the epidemic districts of Whitechapel, Bermondsey, Lambeth, St. Saviour's Union, Newington Union, St. George's in-the-East, St. Giles and St. George, Bloomsbury, Kensington, St. Margaret and St. John, Westminster, Bethnal Green, Chelsea, St. George's, Southwark, Rotherhithe, St. Olave's, Southwark (by John Sutherland, Esq., M.D., Medical Superintending Inspector).
- Notification as to the discontinuance of the use of certain descriptions of cellar dwellings, under the 67th clause of the Public Health Act, 1848, and also as to the Common Lodging-houses Act, 1851, and the Labouring Classes Lodging-houses Act, 1851 (14 & 15 Vict. cc. 28 and 34).

Report on the present state of certain parts of the metropolis (Agar Town, &c.), and on model lodging houses of London, by R. D. Grainger, Esq. (laid before Parliament, July 1851).

Report by the General Board on the supply of water to the metropolis (1850).

Appendix No. 1. (containing returns to the queries addressed to the several metropolitan water companies).

Appendix No. 2. (containing engineering reports and evidence).

Appendix No. 3. (containing report and evidence; medical, chemical, geological, and miscellaneous).

Appendix No. 4. (containing reports, &c., on the cesspool system in Paris).

Supplemental report to the General Board of Health, with papers of suggestions on the proposed gathering grounds from the soft water springs of the Surrey sands.

Byelaws for lodging-houses.

Ditto for slaughter-houses.

Ditto for street cleansing.

Ditto for towns cleansing.

Report on a general scheme of extramural sepulture, (presented to both Houses of Parliament, by command of Her Majesty, 1850).

Report on a general scheme of extramural sepulture for country towns (presented to both Houses of Parliament, by command of Her Majesty, 1851).

Report to the General Board of Health on interments, by Robert Rawlinson, Esq., C.E.

Report to the General Board of Health on intramural interments, by William Ranger, Esq., C.E.

Report to the General Board of Health on interments in towns visited during 1849 and 1850, by William Lee, Esq., C.E.

Scheme for providing a burial-ground in the township of Huddersfield, in the parish of Huddersfield, and for regulating the same under the provisions of the Nuisances Removal and Diseases Prevention Act, 1849.

Certificate of the General Board of Health for closing burial-grounds within the municipal borough of Newcastle-under-Lyme.

Certificate of the General Board of Health for closing the burial-ground of St. George's church, in the municipal borough of Wolverhampton.

Certificate of the General Board of Health for closing burial-grounds within the district of the borough of Reading.

Scheme for providing a burial-ground in the borough of Dorchester, and for regulating the same under the provisions of the Nuisances Removal and Diseases Prevention Act, 1849.

Papers received by the General Board of Health, exhibiting the operation of the Common Lodging-Houses Act. Laid before Parliament.

Statement of the preliminary inquiry by Southwood Smith, Esq., M.D., and John Sutherland, Esq., M.D., on the epidemic at Croydon; together with reports by Richard Dugard Grainger, Esq. and Henry Austin, Esq., C.E., to the General Board of Health, on the circumstances connected with the epidemic attack of fever at Croydon. Presented to Parliament.

Further Report from the consulting engineer to the General Board of Health on the Croydon drainage. Presented to both Houses of Parliament.

BUSINESS TRANSACTED UNDER "METROPOLITAN INTERMENTS ACT, 1850."

The correspondence connected with the Metropolitan Interments Act, not specially alluded to under the above head, is included in the statement already given of the gross office correspondence.

Board meetings, at which business under the Metropolitan Interments Act has been transacted - - - 209

Examination by a deputation from the Board to Paris of the mode of interment pursued there, and of the police regulations connected therewith.

Digest of the forms used by the French government in connexion with the interment of the dead.

Report of the management of Reception-houses in Germany.

A report on each of the metropolitan cemeteries, together with estimates of their proximate value.

A general report on all the cemeteries, with estimates of the value thereof, and of the works existing thereon, chiefly with a view to their adaptation for purposes of interment.

Reports on sixteen sites offered to the Board for metropolitan cemeteries.

Reports on Erith, Epping Forest, Epping Lower Forest, and Hainault Forest, as sites for cemeteries.

Reports on the division of the metropolis into medical districts, and on the means of carrying the dead by canal.

Reports on cemetery arrangements.

Report on the architectural construction and embellishment of reception chapels for the dead.

Business connected with the preparation of plans of reception chapels.

Reports on the planting and monumental decorations of cemeteries, and on the arrangement of cemetery chapels.

Reports on the burial vaults of metropolitan churches.

- Report on the best mode of ascertaining the facts relating to the amount of compensation which may be payable under the Metropolitan Interments Act to the clergy and officers of the various metropolitan parishes.
- Business preparatory to the commencement of the inquiry as to claims for compensation, under sections 32, 33, 34, and 35 of the Metropolitan Interments Act.
- Report explanatory of the principles followed by the officers of the Board in estimating the value of the Brompton and Nunhead cemeteries.
- Report on the suitability of Abbey Wood estate, at Erith, for a cemetery, with estimates of its value.
- Plans of reception houses and chapels required in new cemeteries. (Prepared.)
- Forms prepared, adapted to the registration and transfer of mortgage securities, under the Metropolitan Interments Act.
- General report on the compensation inquiry.
- Report on the preliminary proceedings of the Board, under the Metropolitan Interments Act, from 5th August to 31st December 1850. (Presented to Parliament.)
- Return of persons engaged as officers or assistants under the Metropolitan Interments Act, and of all sums expended in relation thereto. (By order of the House of Commons.)
- Report on the Metropolitan Places of Interment, in which the evils arising from overcrowding are most glaring.
- Report on the amount of compensation which becomes payable on closing the grave-yards included in the foregoing report.
- Report on the best means of providing temporary interment of the dead in the parish of Kensington.
- Draft Bill for facilitating the establishment of extramural cemeteries for provincial towns.
- Second annual report of the General Board of Health, under section 73 of the Metropolitan Interments Act. (Presented to Parliament by Her Majesty's Command.)
- Correspondence was had, altogether, with the clergy of 173 parishes, within the Metropolitan Burial District, in relation to their claims for compensation.
- Circulars were issued in every case to the clergy of each metropolitan parish, inviting them to attend the inquiry, (enclosing forms of compensation, returns, and printed instructions); also circulars to the parish clerks, the vestry clerks, and to the sextons, in relation to the same subject, during the progress of the same inquiry, under the Metropolitan Interments Act, 1850.
- In the whole, the claims of 170 parishes to compensation were received; the accounts relating thereto examined; the evidence of the different claimants recorded; and the result of such examination and evidence reported.
- Returns prepared for and laid before Parliament, in relation to the Metropolitan Interments Act, 1850.

Copies of the minutes of the General Board of Health respecting their proceeding under the Metropolitan Interments Act, 1850; and of all correspondence relating to the purchase of cemeteries, and of the Abbey Wood estate. (Presented August 1851.)

A further return was afterwards made to the House of Commons, continuing the above correspondence to a later period.

Returns of the names and salaries, &c. of officers engaged in carrying out the provisions of the Metropolitan Interments Act, 1850. (Presented April 1852.)

1. Account of all monies received by the General Board of Health from any source, and of the monies paid by them since the creation of the Board in 1848, to the 31st December 1853.

DR.		CR.	
To Amounts received	- £65,161 10 8	By Amounts paid	- - £63,969 4 6
		By Balance	- - - 1,192 6 2
	<u>£65,161 10 8</u>		<u>£65,161 10 8</u>

2. Amounts repayable by Local Boards, £23,500.

3. Annual Expenditure from September 1848 to 31st December 1853.

Period.	Amount voted.	Total Expenditure.	Total Expenditure under the Public Health Act.	Total Expenditure under Nuisances Removal Act.
	£	£ s. d.	£ s. d.	£ s. d.
For the year ending 30 Sept. 1849	15,152	14,730 12 1	9,768 18 11	4,961 13 2
„ 18 months „ 31st March 1851	20,700	18,928 10 11	14,376 4 1	4,552 6 10
„ year „ 31st March 1852	9,969	9,278 14 1	8,380 16 7	897 17 6
„ Year ending 31st March 1853	10,745	11,748 1 9	9,877 1 4	1,871 0 5
„ 9 months „ 31st Dec. 1853 -	8,997	9,283 5 8	6,984 13 2	2,298 12 6
	<u>65,563</u>	<u>63,969 4 6</u>	<u>49,387 14 1</u>	<u>14,581 10 5</u>

* Note.—The total amount voted was 11,996*l*.; the above sum is three-fourths of the vote for the year.

Liabilities for expenses incurred to 31 December 1853	- - - - -	£1,150 0 0
Balance of amount voted after deducting amount expended for the whole period and the liabilities		443 15 6
Average annual expenditure under the Public Health Act, after deducting amount repayable by Local Boards	- - - - -	<u>4,931 0 0</u>

DISEASES.

THEIR Proportion per Cent. Nerves, and Senses.	Proportion per Cent. of Deaths at each Age, to each Class of Disease.	Diseases of the Digestive Organs.	Proportion per Cent. of Deaths at each Age, to each Class of Disease.	Accidents or Violence.	Proportion per Cent. of Deaths at each Age, to each Class of Disease.	Other Causes.	Proportion per Cent. of Deaths at each Age, to each Class of Disease.	TOTAL.	Proportion per Cent. of Deaths at each Age.
811	53.2	8,557	35.	3,161	23.	44,089	33.4	158,815	37.7
160	2.4	673	2.8	1,330	9.7	3,352	2.6	19,137	4.5
709	1.4	454	1.9	923	6.7	1,981	1.5	10,431	2.5
774	1.6	568	2.3	998	7.3	1,889	1.4	13,741	3.3
790	1.6	757	3.1	982	7.2	2,190	1.7	16,565	4.
816	1.7	821	3.3	833	6.	2,384	1.8	15,406	3.6
799	1.6	849	3.5	719	5.2	2,648	2.	14,249	3.4
129	2.3	987	4.	670	5.	2,921	2.2	14,220	3.4
148	2.3	1,082	4.4	603	4.4	3,101	2.3	13,826	3.3
275	2.6	1,191	4.9	629	4.6	3,329	2.5	13,597	3.2
392	2.9	1,353	5.5	529	3.4	3,725	2.8	13,665	3.3
716	3.5	1,551	6.3	472	3.8	4,370	3.3	14,597	3.5
233	4.6	1,592	6.5	438	3.5	5,909	4.5	17,428	4.1
448	5.	1,533	6.3	352	2.8	7,453	5.6	18,543	4.4
538	5.2	1,240	5.	296	2.	10,644	8.	20,717	5.
201	4.7	801	3.3	298	2.	11,968	9.1	19,909	4.7
089	2.2	343	1.4	181	1.3	10,511	8.	14,450	3.4
137	.9	108	.4	100	.7	6,280	4.8	7,867	1.9
73	.2	19	.08	35	.2	2,219	1.7	2,577	.6
16	.04	4	.02	6	.06	767	.7	840	.2
28	.06	9	.04	165	1.2	115	.1	397	.09
574	100	24,492	100	13,720	100	131,835	100	420,977	100
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
11.5	-	5.8	-	3.3	-	31.3	-	100	-
Yrs.M. 26.4	-	Yrs.M. 33.	-	Yrs.M. 27.2	-	Yrs.M. 41.9	-	Yrs.M. 31.1	-

APPENDIX XIV

APPENDIX XIV.

COMPARISON OF THE COST IN LIFE OF WAR, AND PESTILENCE, AND CIVIL VIOLENCE.

WAR.

OFFICIAL RETURNS of the number of British killed and wounded, both in the Army and Navy, in 22 years of war.

Annual Average			
Army	733		
Navy	166		
		Total Average	
		899	
			KILLED - - - 19,796
			WOUNDED - - - 79,709
Annual Average		Total Annual	
Army	3,151	Average.	
Navy	472	3,623	

PESTILENCE.

Total number of Persons killed by Cholera and Epidemic Diarrhoea in 1848 and 1849, in England and Wales.

* KILLED - 72,180

* Of these 34,337 were able-bodied persons, and of an age to get their own living, being between the ages of 15 and 60. But it is known that there was much omission and falsification of returns, and that these amounts are under-statements of the fatality of the disease.

The number of attacks from Cholera is estimated at two attacks to one death.

The number therefore would be

ATTACKED - 144,360

Of those attacked so many are permanently reduced in strength as to be made more susceptible to the prevalent causes of disease, as to be subjected to premature deaths—equivalent to the premature deaths and wounded in battle.

ANNUAL AVERAGE DEATHS from preventible, i. e. Typhus and other zymotic diseases, from which well-managed public establishments and improved dwellings are kept clear

Annual deaths from other causes, eventually preventible in civil life; those by violence, by improvement in the education and industrial training of manual labourers, rendering them more discreet by improvement in the arts, rendering processes and engines more safe, and by moral, religious, and physical training of intellectual labourers less liable to mental aberrations and to suicides; these deaths are from year to year nearly as they were returned in 1849, viz.:

Fractures	4,170
Burns and Scalds	2,761
Drowning	2,433
Hanging and Suffocation	1,069
Wounds	542
Poison	444
	11,419

or more than eleven times as many as the average loss of life in battle.

LOSSES IN PARTICULAR BATTLES.

	Killed.	Wounded.
Waterloo (total British killed on the field)	1,771	6,892
Salamanca	388	2,714
* Vittoria	601	2,807
Talavera	670	3,406
Lord Howe's victory	287	806
Trafalgar	449	1,214
Nile	218	677
Copenhagen	254	689
Barossa	202	1,040

Losses from CHOLERA and DIARRHOEA in particular districts, 1848-1849.

Metropolis 1848 and 1849	
Cholera	14,139
Diarrhoea	3,489
Total killed	*18,036

Of these 8,903 were able-bodied persons.

Newcastle, 1853, killed by Cholera	1,543
Gateshead	560
Total	2,103

On the Medical Inspectors being sent from the General Board of Health to make preparations in the West Indies against the threatened visitation of the Asiatic Cholera, application was made for insurances; but none could be obtained from any respectable office in London, under less than 12 per cent. on the amount insured. Of the three one was so reduced by the climate, that he died immediately on his return, and another had a dangerous attack of yellow fever.

Of the medical men engaged in the actual visitation and treatment of the severe epidemics, as many as 12 per cent. have died; in some instances, as many as 20 per cent. have been killed.

The Secretary of the London City Mission Society states that though the missionaries have many of them previously been born and bred in poor districts, and accustomed to hard and trying labour, a considerable number of them are continually laid aside, and very many who promised best have to give up altogether in a few years. "Indeed very few of them with all these advantages, can stand many years work on the really bad districts of London, although thirty-six hours visiting each week is all which is required of them.

"We sustain as much loss of life and health in prosecuting missionary work in London as those societies do, the object of which is to send missionaries to foreign parts, many of which are notoriously unhealthy. This is a reproach to the metropolis of our country. There are some districts respecting which we almost feel sometimes a question whether we ought to expose the health and life of men, by placing them on them: and there are other districts on which missionary after missionary has broken down when located there: while even in a large number of our districts, the energy, strength, and vigour of our missionaries become impaired by their constant exposure to impure air."

The widowhood and orphanage from pestilence, inasmuch as there is always a large proportion of married adults attacked, are immeasurably greater in proportion to the gross numbers of killed than in war. In 1842, on an enumeration, it appeared that there were then 27,000 cases of premature widowhood and upwards of 100,000 orphans then chargeable to the poor rates from preventable causes. In the returns from twelve Unions, where there had been 11,170 deaths from Cholera, it was found that there were 3,567 widows and orphans chargeable to the epidemic cholera of 1848-49, and an expenditure, for only four years' relief, of £121,000. In the same proportion for the whole of the 72,000 deaths, the total number of widows of the class falling into destitution would be 23,000 and the four years' charge of them, 780,000.

The total expense of funerals is estimated at 500,000*l.*, and the total private as well as public expenses of that one epidemic at not less than two millions, notwithstanding extensive checks and mitigations.

Taking as the test of the obtainable rate of mortality the rate obtained in good old dwellings improved by self-cleansing drainage works as well as by improved supplies of water, as well as in the new model dwellings, namely, 13 in a thousand (the common average of the whole kingdom being 23 in a thousand), the total annual losses from preventable disease, from lost labour by premature death, and excessive and premature sickness, and the expense of excessive numbers of funerals, is under estimated at 12 millions per annum, or about the total annual charge of the entire army and navy.

• Sir Richard Heneghan, formerly head of the field train department of the Allied Armies under the command of the Duke of Wellington, states in a work narrating his military experience during seven years campaigns throughout the Peninsular War:—"Allowing half the shots served out to have been fired at the Battle of Vittoria, 3,675,000 rounds were fired against the enemy, of whom 8,000 were killed or wounded; consequently, "only one musket shot out of 459 took effect; and this calculation includes the injury inflicted on the enemy by 90 pieces of artillery, which on the average fired 73 rounds of shot and shell each, making a total of 6,870 rounds. The cavalry were but slightly engaged during that day. At every battle in the Peninsula except Barossa, the author remarked "the same undue expenditure of ammunition in relation to the small extent of damage."

The Official Returns show that during the last forty-one months of the Peninsular War whilst 24,530 privates died of disease, only 8,999 died of wounds or were killed in battle. The deaths during the campaign were, of the privates in battle 42 per cent., of disease 11.9 per cent.; of officers in battle 6.6 per cent., of disease 3.7 per cent. per annum. The average deaths in four battles, Talavera, Salamanca, Vittoria, and Waterloo, were 3.9 per cent. of officers; 2.11 of privates.

In the Peninsular War there were generally 22½ per cent. of men absent on account of sickness, and a reduction of the proportions of sick to 6 per cent. would have set free 10,000 men from the hospitals to be added to the effective force of the army.

The highest increased charge for insurance of military men during the Peninsular campaigns was ten guineas per cent. The extra premiums taken on the insurance of military lives in service in India and China are from three to five guineas per cent., governed, however, by the unfavourable chances of the climate to which the campaign leads, as well as by the increased risks from battle.

The extra premiums on naval officers in hostile service is usually from three to five guineas per cent., governed by the consideration of the climate.

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