BOOK FIVE

THE APPROACH TO PUBLIC HEALTH

CHAPTER I

THE SANITARY REPORT OF 1842

I

FOR four years Chadwick's views carried no weight at all in the Poor Law Commission. After the last and fatal quarrel with George Cornewall Lewis, his fortunes seemed at their lowest ebb. At just this time his Sanitary Report burst on a startled middle-class public. Its immediate success was electric. Its sales far exceeded that of any other blue books, thousands of copies were circulated free of charge, and since it was his name alone which appeared on the title page, to him went the fullness of the glory. Its success carried him along with it. For a brief moment he turned back to the Second Constabulary Report, only to be snatched away from it to write a report on interments, then to help the Health of Towns Commission, next to aid in the Public Health Bills of 1847–8, and finally to end in the position of England's first paid Commissioner for Public Health.

Thus these years, bounded on the one side by the sordid squabble over the Macclesfield Report and on the other side by the battle royal over the Andover affair, were days when Chadwick was neither fish nor fowl, neither administering the Poor Laws nor administering public health. They were, on the other hand, the great years of the public health agitation, the seedtime for all the great measures and investigations that followed on the Report. The story of these years is, in the words of Chadwick's noble disciple and friend, John Simon, 'Above all, an account of the zealous labours of one eminent public servant, . . . Sir Edwin Chadwick'.[1]

II

Chadwick finished the Report by the end of 1841. He had spent two years on it. He had gone to every foreign source he could lay hands on,

[1] Simon, *Sanitary Institutions*, p. 179.

from the French statisticians like Villermé to the German authorities on medical police, like Professor Mohler. He had grasped the meaning of Liebig's revolutionary work on *The Chemistry of the Soil* and incorporated its doctrine as an integral part of his solution of the sanitary problem. Omitting any reference at all to his countless secondary authorities in English and the innumerable private correspondents to whom he turned in his insatiable quest for facts, the official data alone must have equalled *nine* folio volumes of printed matter of the same bulk as the thirteen volumes laid before the Board of Royal Commissioners in 1832–4.[1] The result was undeniably Chadwick's masterpiece, and the world hailed it as such.

The Press lavished praise upon it. At the King's Printers its sale was seven or eight times that of any other Report. Over 10,000 copies were distributed free of charge.[2] It was circulated to every Mechanics Institute in the kingdom. The approval of Chadwick's friends was just as warm as the public's. J. S. Mill, who revised it for him, read through the Report 'slowly and carefully', and could comment only: 'I do not find a single erroneous or questionable position in it, while there is the strength and largeness of practical views which are characteristic of all you do'.[3] Nassau Senior and James Stephen were delighted both with the performance and with Chadwick's conclusions. Even the ranks of Tuscany cheered: G. C. Lewis had to admit that 'it contains a great deal of good matter, and on the whole, I prefer it to anything else he has written'.[4]

Yet it is astonishing to learn that this great social document—one of the most significant in the nineteenth century—nearly went the way of so many others, and only narrowly escaped suppression. Its first hazard was the displeasure of Lord Normanby. The Reports of 1838 and 1839 and subsequent tours of the East End slums in the company of Southwood Smith made Normanby an enthusiastic advocate of sanitary reform. It will be remembered that those Reports—with Chadwick's hearty acquiescence at the time—centred their proposals on the improvement of the *dwelling-house*. Scavenging was to be improved, sewers and

[1] Two volumes containing the medical reports were published. From the Unions and medical officers, nearly 3000 replies must have come in: this number is about the same as those which made up the seven volumes of *Rural and Urban Queries* of the 1832–4 Enquiry.

[2] One may gauge the effect of this circulation by the fact that the sale of 1,500 copies of *Sketches by Boz* was considered remarkable; that the cheap republications of Scott's works sold only 40,000 copies; and that the sale of annuals which were immensely popular never ran to much more than 10,000 copies.

[3] J. S. Mill to Edwin Chadwick, 1842. (Two letters, undated.)

[4] G. C. Lewis to Grote, 13th March 1842. (*Letters of the Rt. Hon. G. C. Lewis*, p. 120.)

surface drainage introduced into the courts and alleys, the streets were to be widened and ventilated, but above all, there was to be a Metropolitan Building Act. These suggestions were confirmed and greatly elaborated by a Select Committee which sat throughout 1840. This was moved by R. A. Slaney,[1] another enthusiastic convert to sanitary reform; it recommended the immediate introduction of a general Building Act and a general Sewerage Act, the establishment of local Boards of Health and the appointment of local sanitary inspectors.[2] Accordingly, as soon as the 1841 session began, Normanby introduced a Building Bill based upon these recommendations.

But by this time Chadwick had completely abandoned his earlier views! The years 1839–41 mark a watershed in his thought. In 1841 his Report reached conclusions from whose principles he was never to deviate. It shifted the emphasis from the improvement of the dwelling-house to its external sanitation and drainage.[3] Furthermore, it propounded a *system*: house drainage, main drainage, paving, and street-cleansing were now to be considered as integral parts of a single process mechanically motivated by the constant supply of water at high pressure. He regarded his earlier proposals, therefore, not only as inadequate but as positively harmful and therefore tried to persuade Normanby to abandon the Building Bill, or at least to postpone it until his own Report was complete.[4]

But Normanby felt Chadwick was making a fool of him. He had already been led by the nose over Poor Law policy and was increasingly inclined to side with George Lewis and deem Chadwick an unpractical extremist. Now he was carrying out a policy which Chadwick had himself recommended—only to be met with a volley of criticism! The reason was clear—there was no pleasing the man. Whatever Chadwick thought was right: whatever others did was wrong.

Moreover, the criticisms might endanger his Bill. *The Times* had greeted it with rage while the Commons referred it to a Select Committee which split it into three separate Bills and was so amending it that there was every chance the measure might be lost. This thought was unendurable to Normanby, whose enthusiasm for sanitation was mixed up, not unintelligibly, with the ambition to win the reformer's crown. The Government also was anxious to pass the Bill, as a last attempt to

[1] 4th February 1840.

[2] It recommended also that further investigation should deal with burial grounds, water-supply, parks, lodging-houses, baths, and site improvements.

[3] Joseph Paxton to E. Chadwick, 30th September 1842.

[4] E. Chadwick to Lord Normanby, 3rd February 1841; E. Chadwick to Manners Sutton, 13th July 1842; E. Chadwick to Sir J. Graham, 12th May 1843.

stave off the contempt and odium into which it had fallen. Normanby's reply therefore was brutal in the extreme. He declined to postpone his measure and forthwith forbade any further work on the Sanitary Report. Thus this Enquiry too was sadly laid aside, to join the heap of enquiries proposed but not sanctioned, or sanctioned and then countermanded, or completed only to be suppressed.

By a curious quirk, however, the very elections which ruined Chadwick's hopes of promotion and which for a space threatened even his situation as Secretary, brought reprieve to the Report. Normanby's Bills had, of course, dropped at the dissolution of Parliament. Graham promised to reintroduce them but had no objection to Chadwick completing his enquiry. Having refused him promotion and encouraged Lewis to exclude him from Poor Law matters, it was Graham's policy to keep him quiet by occupying him with such investigations. At the beginning of November 1841, therefore, Chadwick was told to complete the report and he forthwith put on all speed to finish it by February 1842 when Parliament would reassemble.

This was done: but no sooner was the Report in draft than it underwent a second hazard. George Lewis refused to have it published. Chadwick's protests were unavailing.

Lewis shrank from antagonizing public opinion even more than his father had, and the Report certainly did not mince its words. It contained merciless strictures on the London water companies and the Metropolitan Commissions of Sewers; it indicted local administration and sneered at the medical profession. Chadwick refused to abate one jot of his criticism. Lewis, equally obstinate, told him that therefore he would veto its adoption. 'It is calculated', he said, 'to give offence to the Commissioners of Sewers and other similar authorities'.[1]

Fortunately Nicholls intervened, and since Lewis declined to take responsibility for the Report's radical sentiments, he proposed a compromise greatly to Chadwick's advantage. The Report was to be published under his own name as his own personal opinion.[2] In this form it was published, and linked Chadwick's name immemorially with the cause of sanitary reform.

III

The suddenness with which the people of England appeared for the first time to acquire a sense of sight and smell and realize that they were living on a dung heap, was due to the impact of industrial change. By the 1840's, the slow procession of piecemeal alterations in modes of production and ways of life had produced a qualitative change visible to all. England was rich. England lived in towns. England worked in factories, and travelled by rail. And as these economic techniques offered the possibility of revolutionizing the sanitation of towns, they also made the need for such remedies more acute.

[1] E. Chadwick's *First Vindicating Letter to Sir G. Grey*, 21st June 1847.
[2] Ibid.

Engineering skill and the new riches made a sanitary science possible. 'That England in general is far in advance of the Continent in "social matters" is a matter of course', Engels could explain. 'England is the motherland of modern large-scale industry; the capitalist mode of production has developed here most freely and extensively of all, its consequences show themselves here most glaringly of all and therefore it is here also that they first produce a reaction in the sphere of legislation'.[1] Similarly, Chadwick could write that the experience on which his sanitary conclusions rested 'is neither recent nor confined to this country. That which is new is the advantages we possess beyond other times and perhaps beyond all other countries in capital and practical science for its application.'[2]

At the same time and by the same process, the urban economy by which the engineering skill was developed and the new riches got, made a sanitary science necessary. The story was told in the death rates themselves. The eighteenth-century town improvement had outstripped the accumulation of town evils. The death rate fell and continued to fall until the 1820's and the 1830's. Then the increasing deterioration of town conditions overtook and soon far surpassed the rate of improvement. Between 1831 and 1841 the death rate per thousand of Birmingham shot up from 14·6 to 27·2; of Leeds, from 20·7 to 27·2; of Bristol, from 16·9 to 31; of Manchester, from 30·2 to 33·8; and of Liverpool, from 21 to 34·8. The average of all five showed an increase from 20·69 to 30·8.[3]

The reasons why the town of 1840 had outgrown the sanitary care and weak administration of its obsolete authorities, lay in its size, or in its *function*, or in the *speed of its growth*, or, what was most usual, in all three together. Between 1801 and 1831, Bradford leapt from 29,000 to 77,000 inhabitants; Halifax from 63,000 to 110,000; Huddersfield from 15,000 to 34,000; Leeds from 53,000 to 123,000. London itself expanded from 958,000 in 1801 to 1,948,000 in 1841. So the towns

[1] F. Engels, *The Housing Question* (pub., Lawrence & Wishart), p. 68.
[2] *The Sanitary Report*, 1842, p. 90.
[3] Griffiths, *Population Problems in the Age of Malthus*, p. 186.

spread in area, and since building could not keep pace with the influx of newcomers, became more densely packed. As the size and density of the town population increased, deposits of refuse accumulated, the air became foul, the water supply inadequate and tainted. But if the town were a manufacturing centre all these evils became still more accentuated. Here trade refuse had to be disposed of. There was neither the authority to compel, nor the means to execute, the removal of such wastes. The deposits accumulated, rotted, and stank. The smoke of the mills and furnaces filled the air. The brooks and streams, such as they were, were rendered undrinkable, for the mills dammed them with weirs for water power, and, not content with rendering them stagnant, shot the trade refuse into them as a convenient open sewer. In the manufacturing towns air was still fouler, street and house cleaning still more backward, pure water still more hard to come by than in a large but residential town.

One might think that such animal and trade refuse could be carried off by the sewers. But it was illegal to connect house drains to sewers. The sewer was in origin a ditch for draining land, and it was still considered as nothing more than a drain to take the storm water off the streets. In the Metropolis, for example, not more than one-third of the houses had communications with the sewers.[1] This was just as well, for where the sewers did exist (and this was only in the richer parts of the towns), they were so ill-constructed that the sewage frequently flowed, not away from the towns, but back into their most low-lying portions ; and so inadequate was the supply of water in the sewers that the sewage frequently remained there to rot.

In any case if the town were of recent growth there might not be any sewerage at all. The speed at which the town grew still further worsened its sanitary conditions, and only too many of the manufacturing towns were of such mushroom growth. They had sprung up as a cluster of workmen's dwellings around a group of country mills, and to this day they retain this frontier character. They became the paradise of the speculative builder and landlord. Unrestained by any building regulations, these set out to make as much profit as they could by any means they cared to use. So houses were built without house drains, and roads without road drains, a state of affairs which spelled cesspools, faecal deposits, and unbelievable lack of ventilation. Back-to-back house building with one privy to thirty buildings, and water supplied for an hour or so a day out of a public stand-pipe were enough to convert the estate into a sea of offal, stinking excrement, and

[1] Second Report of the Royal Commission on the Health of Towns (1845), p. 51.

dirt. Letting, sub-letting, and sub-sub-letting until a single room might be occupied by a dozen families added overcrowding and sexual promiscuity to the other horrors. The size and density of the towns was worsened by their manufacturing character ; but when they became the province of speculation as well, it was small wonder that in the new manufacturing towns more than one in every two children died before it reached the age of five.

Of fifty large towns examined in 1843–4 by the Health of Towns Commission, there was hardly one in which the drainage was good, and only six where the water supply was good ; in thirteen the water supply was indifferent, in seven the drainage. In forty-two the drainage, and in thirty-one the water supply was supremely bad. The proportion of privies to houses reads like a nightmare. There were parts of Manchester where thirty-three privies had to supply 7,095 persons—a proportion of one privy to every 215 persons. In the whole town of Sunderland the proportion was one privy to seventy-six persons. These 'are quoted', said the Report, 'as instances of a *general* deficiency and not as isolated cases'.

For sanitary purposes, the administration of the towns was mediaeval. Among the authorities there were first the Commissions of Sewers. Their powers were legally restricted : as close bodies they were often inefficient, and equally often they fell into the hands of corrupt cliques. The areas they administered bore little or no relation to the natural basis of drainage. Another mediaeval survival, the Municipal Corporation, had as yet shown little inclination to meddle in sanitary matters. In some unincorporated towns the courts leet might survive as cumbrous, almost unworkable bodies before which citizens might be indicted for Common Law nuisances. They were so inefficient that in 1832 they had been supplanted by *ad hoc* Health Boards for the duration of the cholera epidemic. For the most part, none of these institutions functioned, and then, the only drainage authority was the vestry, and the only code an obsolete Highway Act.

Conscious of their inadequacy, the eighteenth century had in some 300 cases overlaid these authorities by 'Improvement Commissions'. They were of all kinds, for all purposes, and varied in effectiveness. Some paved streets and some lighted streets, some controlled a police force and some had authority to build, drain, and sewer. They were independent and jealous of one another. St Pancras alone had nineteen. Birmingham was drained by three distinct sets of commissioners and four boards of surveyors, all at loggerheads. Each township of Manchester formed a distinct drainage jurisdiction. In Liverpool the town council

looked after scavenging, water supply, and building erection, but general sewerage and paving were in the hands of two distinct and mutually hostile commissions.

'Division of labour in the arts', commented Chadwick, 'derives its efficiency from combination, adaptation, and subordination to direction to one end; but that which appears to be a division of labour in local administration is, in fact, an insubordinate separation weakening the means of securing adequate skill and power, occasioning obstructions and defective execution, and enhancing expense. Were pins or machines made as sewers or roads are constructed, shafts of pins would be made without reference to heads—in machines screws would be made without sockets and it may be confidently stated, there would not be a safe or perfect and well-working machine in the whole country. . . .'[1]

So, while population grew, formed itself into towns and congregated in factory and slum, as it clotted into communities, all such societies were still governed by the administrative makeshifts and engineering skill which had maladministered even the Elizabethan town. Yet all around gleamed the administrative possibilities, the capital, and the engineering marvels which the railway age had ushered in.

IV

In following the course of Chadwick's Report where he attempted to solve these problems, one runs into a curious difficulty. To take a chance example, it seems so evident that a self-acting gravitational sewer must never run uphill, that one is perplexed and bewildered to find surveyors of the 'forties unversed in the use of spirit-levels. Since that date, in the intervening century, the fund of social knowledge has evidently so increased that the necessity of spirit-levels and surveys in laying a drain seems the most banal commonplace. The roles are quite reversed; while Victorian England gasped at the boldness of the innovation, the twentieth century looks back upon the 1840's with a puzzled wonder of an Alice stepping into the world behind the looking-glass.

Similarly the influence of dirt and overcrowding upon health is to-day such a commonplace that to enlarge upon it or on Chadwick's proofs of the connexion, would be insufferably tedious and quite unnecessary. Yet, in proving this connexion and forming a public opinion to uphold the proof lay the immediate value of the Report. Chadwick's catalogue of horrors, each as bad in its way as his own experiences in Glasgow, and his slow, laboured, patient evidence that health improved

[1] *The Sanitary Report*, p. 323.

as such filthy conditions were abolished, impressed his public most forcibly. It alone made possible the adoption of the solutions he outlined and which, confirmed three years later by the great Commission on the Health of Towns, laid the foundation of all subsequent sanitary science.

Chadwick himself was convinced that such a connexion existed even before he started the Enquiry. In his circular letter to the medical officers he boldly stated that his intention was 'to ascertain the existence and extent of the *visible* and *removable* agencies promoting the prevalence of such disease as are *commonly found connected with* defects in the situation and the structure or internal economy or the residences of the labouring classes'.[1] What the Enquiry itself achieved was the further definition of this connexion. By proving that the individual had no control over these conditions the remedy was lifted at once from the regime of private initiative to that of public administration.[2] In the second place, the range of what were to be deemed the most critical defects was still further narrowed. 'The defects', wrote Chadwick, 'which are the most important and which come most immediately within practical legislative and administrative control, are those chiefly *external* to the dwellings of the population and *principally* arise from the neglect of drainage'; and by these 'external' defects, Chadwick meant not drainage *per se*, but the lack of facilities for the removal of refuse from the roads and streets and from the houses themselves. Thus, by this second limitation of this problem it became an administrative problem not of medical or curative science but of engineering.[3]

Indeed, throughout the whole Report there was not the slightest concession to the claims of curative medicine. On the contrary there was a sustained attack upon it. He would have ignored the doctors had the doctors themselves been content to leave his conclusions alone. On the contrary, the air was thick with bitter controversies between the adherents of the contagionist and those of the simple-infection schools. A powerful body of medical men swore by Bancroft of St George's Hospital, and affirmed not only that fever was not contagious, but that 'if putrefying animal matters are not completely harmless, they are at least, innocent of the charge of producing contagious fever'.[4]

This bickering Chadwick disposed of in one savage paragraph and then returned to his engineering preoccupations:

[1] *The Sanitary Report*, p. xiv. My italics.
[2] Cf. Circular letter to dispensary surgeons and medical practitioners in Scotland, *The Sanitary Report*, p. xvii. Ibid., p. 233, my italics.
[3] *The Sanitary Report*, p. 25.
[4] *An Essay on the Disease called Yellow Fever*, by E. N. Bancroft, M.D. (pub. 1817), pp. 118 et seq., and App. ii, pp. 634–44.

'The medical controversy as to causes of fever; as to whether it is caused by filth and vitiated atmosphere, or whether the state of the atmosphere is a predisposing cause to the reception of the fever, or the means of propagating that disease which has really some other, superior, independent or specific cause, does not appear to be one that for practical purposes need be considered, except that its effect is prejudicial in diverting attention from *the practical means of prevention*. . . .

'. . . it cannot but be regretted that the enlightened force of the professional opinion should sustain any diminution from an apparent want of unanimity on so important a question as the necessity of removing those causes, whether original or predisposing, that, for example, whilst the fleets were ravaged by fever and disease, men of high standing should have occupied the attention of the public with speculations on contagion and infection from gaols as the original cause, and diverted attention from the means of prevention, cleansing, and ventilation, the means by which, as will hereafter be shown, the pestilence was ultimately banished.'[1]

He returned to his own presentation of the problem. 'The chief remedies', as he wrote to Napier,[2] consisted in 'applications of the science of engineering, of which the medical men know nothing; and to gain powers for their applications, and deal with local rights which stand in the way of practical improvements, some jurisprudence is necessary of which the engineers know nothing'.[3] 'The great preventives,' he wrote in the Report, 'drainage, street and house cleansing by means of supplies of water and improved sewerage, and especially the introduction of cheaper and more efficient modes of removing all noxious refuse from the towns, are operations for which aid must be sought from the science of the *Civil Engineer*, not from the physician, who has done his work when he has pointed out the disease *that results from the neglect of proper administrative measures*, and has alleviated the sufferings of the victims.'[4]

The town, then, needed some means of drainage, and of removing the putrefying refuse of houses, streets and roads. The key of the problem, however, was not the mere removal of deposits, but their *immediate* removal, before they had time to stagnate and rot. Yet the state of affairs which he discovered led to a directly opposite result. No wonder Chadwick thundered his denunciation of the state of towns.

'Such', he wrote, 'is the absence of civic economy in some of our towns that their conditions in respect to cleanliness is almost as bad as that of an

[1] *The Sanitary Report*, pp. 148–9.
[2] Edwin Chadwick to Macvey Napier, 11th October 1842.
[3] Chadwick was always careless of his punctuation, and in this sentence I have amended the punctuation to make better sense. In the original it seems, there is a full-stop after 'improvements', and the word 'some' begins a new sentence.
[4] *The Sanitary Report*, p. 341. My italics.

encamped horde, or an undisciplined soldiery. . . . The discipline of the army has advanced beyond the economy of the towns. . . . The towns, whose population never change their encampment have no such care, and whilst the houses, streets, courts, lanes, and streams are polluted and rendered pestilential, the civic officers have generally contented themselves with the most barbarous expedients or sit still amongst the pollution, with the resignation of Turkish fatalists under the supposed destiny of the prevalent ignorance, sloth and filth.'[1]

Over the larger part of the towns there was no provision, whether municipal or private, for any means of cleansing at all. But where such provision was made it actively increased the accumulation of putrescent deposits. The water supply, whether derived from a river, a water company or a well, had to be stored in the houses: in a water tank in a wealthy house, in kettles or buckets in the poorer quarters. Here it would stagnate and become too dirty to wash in, too tainted to drink. Poor families could not wash their clothes; all they could do was to pass dirty linen through dirtier water.[2] The majority of the towns, like Inverness, contained scarcely one house that could boast of either water-closet or privy, and provided not more than one or two public conveniences for their whole population. So that in these towns there was not a street, not a court lane or approach, that was not disgustingly defiled by human ordure.[3]

Even if the house did possess a privy, it might have nowhere to deposit the contents. There were houses whose yards were completely covered with human ordure six inches deep, across which the inhabitants stepped on bricks.[4] In any case the usual mode of discharging the contents of privies was to connect them with a cesspool. These were allowed to accumulate and fill up with the disgusting liquid. At the best, they were cleaned out two or three times a year, more usually once every two years. On these rare occasions men with two-horse carts would shovel the sickening mess into buckets, until the carts were full, and then drive away with it to fling it in the river.[5] Sometimes, however, the cleaning contractors regretted such a waste of valuable manure. Then they would sell it to manure contractors who would deposit it in dumps, whence the stinking liquor oozed down the walls and into the neighbouring streets.[6] Street cleansing itself was a manual activity, performed but rarely in the highways, never in the alleys and courts, and managed as a separate service totally unconnected with house drainage and road sewerage.

[1] *The Sanitary Report*, p. 44.
[2] Ibid., p. 64.
[3] Ibid., p. 43.
[4] Ibid., p. 45.
[5] Ibid., pp. 380–1.
[6] Cf. Dickens's Boffin, in *Our Mutual Friend*. Boffin is described as a 'dust' collector—but this is a euphemism for the trade of others outlined above.

There were some favoured houses which might rid themselves of refuse through water-closets, which shot it directly into the road sewers. In most cases this method of refuse disposal only accentuated the evil it was meant to remedy. The sewers were not built to conduct solid matter. They were ill-supplied with water. Frequently they were built uphill, and the sewage oozed back into the lowest levels and stayed there accumulating as a vast, underground and stinking pond. Often they were built higher than the wells into which their sewage oozed. In their brick-built and cavernous tunnels, the putrefying faecal liquor bubbled and gave off foetid exhalations. It remained there for years against the time when the sewer men descended, scooped the liquor into pails, raised it by windlasses to the surface and laid it there, stinking as it was, until the leisurely moment when the carts came up to remove it.[1] And in those sewers where there was enough water to wash the sewage to the outfalls, it would roll thickly and sluggishly until it slopped into the river whence the town's drinking water was drawn, unfiltered by the water companies that supplied it. Thick deposits settled at the bottom of the drinking glass. It was fortunate for the working classes that they possessed such a preference for beer.

How then was Edwin Chadwick to provide a means of clearing away such refuse, cleanly and speedily? As he engaged the problem, it became quite clear that the recommendations of the 1838–9 Reports did not go far enough. It was not enough to suggest, as they did, that sewers should drain the streets and the houses, that scavengers should scour the streets, and that houses should be supplied with water. For at the best, these services would still be disconnected from each other, and at the terminal point of each, the refuse would still accumulate and decay.

Chadwick found that it was impossible to consider any one proposal separately from the others. Southwood Smith, for example, had recommended that the improvements made in the wealthier districts, i.e. the provision of house drains and water-closets discharging directly into the sewers, should be extended to the poorer quarters.[2] Chadwick admitted that these improvements 'save the delay and the previous accumulation and the expense of the old means of removal'.[3] But in the first case there were no sewers in the poorer quarters. In the second place the discharge of the sewers polluted the rivers. And in the third place the remedy would prove worse than the disease; for the sewers were 'so constructed as to accumulate deposits' which while they remained there gave off noxious gases. It was said by one doctor that of all the

[1] *The Sanitary Report*, p. 55. [2] Ibid, p. 48. [3] Ibid., p. 54–5.

cases of severe typhus [1] he had seen, four-fifths were either in houses where the drains to the sewers were untrapped, or which, being trapped, were opposite gully-holes.

In Chadwick's view the first and second objections were not nearly so important as the third. It was a great pity, for could the sewers only be improved, the use of the water-closet was by far the most convenient, cleanly, and economical mode of getting rid of the house refuse. This cardinal defect in the construction of sewers was remedied by the discovery of a Mr John Roe, engineer to the Holborn and Finsbury Commission of Sewers. His discovery, adapted by Chadwick, became the fulcral point of an entirely new conception of town sanitation, the method of 'circulation' instead of stagnation, the 'arterial' system of town drainage.

Roe found out that a new type of sewer, well supplied with water, could sweep away any solid matter within it immediately, cheaply, cleanly, and without the trace of a deposit. Connected to such sewers the water-closet or the soil-pan might discharge their contents through the house drain straight into the sewer, and only a few hours afterwards the refuse would have reached the river. Roe's discovery was the use of steep gradients together with the *egg-shaped sewer*.

The vast majority of sewers, built in brick with upright walls, possessed either a flat or semi-circular base. They had to be built large enough for the cleaners to enter them. Their outfalls were rarely low enough to secure a heavy flow of water down them; and even if they were low enough the common effect of the shallow shape and rough brick sides of the sewers was to impede the flow of water, reduce its pressure on the solid sewage, and therefore leave behind it a wake of solid deposits. The egg-shaped sewer however, was shaped like the cross-section of an egg. It was smaller than the others and therefore cheaper to build. It was stronger for it did not cave in, and was therefore cheaper to maintain. But of prime importance, its pinched-in base formed a deep and narrow channel through which the sewage water had to force itself; and it did so with such velocity and power that all solid sewage, even loose bricks, cats, or rats were swept swiftly and forcibly down to the outfall.[2]

[1] Then confused with *typhoid*.

[2] *The Sanitary Report*, evidence of John Roe, App. i, pp. 373–9. Roe made other very important improvements also; he made the falls low enough to speed still further the velocity of the water; and the sewers were always constructed straight, or in a true curve, and never at right angles with themselves, as the old sewers were. The difference this made to the velocity of the water was considerable. With equal falls, the passage of water took, in a straight line, 90 seconds; along a true curve, 100 seconds; along a right angle, 140 seconds.

As soon as this invention came to his notice, Chadwick proceeded quite easily to his solution. Its central conception was that of an articulated service where water supply, house drainage, street drainage, and the main sewerage and the cleansing of the streets should form a circle in which the motive power and the mode of cleansing depended upon HYDRAULIC POWER. Every service would link with the other through the medium of *water supply*. It was a solution upon a gigantic scale, and at every stage it trampled underfoot some powerful vested interest. It entailed 'the carrying water into every house, the removal of all excreta in suspension in water by means of the soil-pan, etc., the proof that the water-closet may be made mechanically cheaper than the cesspool . . . the evidence as to the application of *liquid* manures . . .; with this', said Chadwick, 'we complete the circle, and realize the Egyptian type of eternity by bringing as it were the serpent's tail into the serpent's mouth.'[1]

In the Report, Chadwick, as it were, worked backwards to this conclusion. He began with the *house*. The use of water-closets, he said, and the immediate discharge of refuse into the sewers was *per se* far more clean and economical than the maintenance and cleansing of private cesspools.[2] But this mode of cleansing was put out of court by the non-existence or the malconstruction of the sewers. Hence Chadwick postulated the complete re-equipment of town sewers with Roe's egg-shaped sewer, which, connected with the houses, would sweep the refuse cleanly and quickly away. 'The comparative economy of conveyance of liquid in pipes', he pointed out, 'has been but little observed, and has only recently perhaps been applied to the purpose of cleansing'.[3] Furthermore, if Roe's sewerage was made universal, the streets also could be swept clean in precisely the same way. 'The expensive and slow process of the removal of the surface refuse of the streets by cartage might be dispensed with and the whole of it carried away by the mode which is proved in the case of the refuse of *houses* to be the most rapid, cheap, and convenient, viz. by sweeping it at once into the sewers and discharging it by water.[4]

The circle was still, however, by no means complete. To sweep the streets in this way, to work the water-closets, and to scour the sewers a stream of water was needed. Yet the common mode of supplying water was to supply it intermittently, that is to say, for two or three hours a

[1] Edwin Chadwick to Lord Francis Egerton, 1st October 1845.
[2] *The Sanitary Report*, p. 48; for pecuniary estimate, pp. 223–4.
[3] Ibid., p. 52; for the adoption of Roe's sewers, pp. 55–9; for attack on London Commissioners of Sewers, pp. 309–22.
[4] Ibid., p. 54.

day on particular days of the week. But in order to work Chadwick's scheme of town cleansing what was needed was a constant stream of water. The water must flow into the water-closets, then out of them, down the house drain into the sewer; it must flow to the house in a tap, to escape through the sink and house drain back into the sewer and add to the water there; and it must be on tap in the streets at any time, to sweep them clear and to flood, together with the solid refuse of the streets, into the sewers. For, in the sewers there had to be enough water to dilute the refuse and carry it rapidly away. Water flowing at a high velocity was the life-blood of the 'arterial system' of town drainage; it was the mainspring of the new mechanism. That was why Chadwick could say, three years later, after the Health of Towns Commission had tested and approved his conclusions: 'the establishment of the economy and the efficiency of the constant supply, will, when fully considered, be found to be a great work—the completion of what I venture to call the venous and arterial system of towns'.[1]

Assuming the provision of such constant supplies, only one problem remained outstanding, and a very difficult problem it was. What was to become of the sewage? The chief objection to the whole of this venous system was, as Chadwick himself acknowledged, 'the pollution of the water of the river into which the sewers are discharged'.[2] This 'loose end' of the sanitary circle was the one which gave Chadwick more labour and trouble than anything else.

Chadwick denied hotly that any 'loose end' need exist. The problem posed, he had gone about looking for a solution. His visit to Edinburgh with Arnott first put him on the track of one. In that city the desperate officials, intent upon securing Chadwick's support in their campaign against the insanitary condition of the town, took him on a round of inspection. One of the greatest sanitary evils was a vast open sewer, originally a brook and which, now that it conveyed the city's refuse to the sea, had been diverted by the adjacent farmers to irrigate their fields. From these, covered as they were with the stinking liquid, a horrible and offensive miasma floated to the city. Nothing the officials could do could persuade the farmers to give over this practice. They stated that its value as manure was worth no less than £150,000 to them, or the produce of 3,000 milch cows.

Chadwick saw; and what struck him was not so much the vast extent of the evil, as the extraordinary qualities of the liquid manure. Investigation showed that diluted as it was, it was certainly less offensive

[1] Edwin Chadwick to Lord Francis Egerton, 1st October 1845.
[2] *The Sanitary Report*, p. 48.

to the smell than solid manure. Consultation with Liebig's great *Chemistry of the Soil* gave a scientific appraisal and proof of the value of such manure; in one year the liquid and solid excrements of a man would produce 16·41 lb. of nitrogen, sufficient to yield the nitrogen for 800 lb. of wheat, rye, or oats, or for 900 lb. of barley. Smith of Deanston, the great agricultural engineer, affirmed that if the sewage could be transported to the fields, irrigation would be a perfectly practicable proposition. But how could it be transported? It was impossible to copy the system of Edinburgh. There, the fields stank to high heaven.[1]

Out of this emerged the hypothesis; 'if in Edinburgh, the contents of the cesspools were carried by adequate supplies of water, in drains from the houses into covered sewers, and thence in *covered* instead of open sewers to the lands at proper distances where it might be distributed as manure by irrigation',[2] the problem might be solved. From the hypothesis grew the assertion: 'effective drainage must make way for the conveyance of diluted manures and consequently for effective irrigation'.[3] From the assertion came more evidence, three years later in the Health of Towns Commission, of its practicability and economy.

With the advocacy of 'liquid manure', the wheel came full circle. The whole town was comprehended in one arterial system. There was no longer to be a separate provision of each sanitary service; water supply connected and motivated them all. From the river, in a constant running stream, it flowed into the taps and water-closets of each house. From these it flowed away, together with the house refuse into the sewers, meeting another stream there from the street pipes which had swept into the sewer the solid refuse off the roads. In the new egg-shaped sewers, these streams of water rushed the sewage smoothly and rapidly to the fringe of the towns; and from there it flowed off to the neighbouring fields to manure the crops, while the river from which it was originally drawn, remained pure and sweet and unpolluted.

Administration

One can picture almost immediately the administrative changes which Chadwick hereupon recommended. They followed directly from the engineering solution. On the one hand there was the need to point out the course, nature and seats of infection, on the other hand there was needed an authority to remedy the causative defects. The first was a medical problem, the second one of engineering. Since

[1] *The Sanitary Report*, pp. 49–52. [2] Ibid., p. 51.
[3] Ibid., p. 50. Cf. *Address to Association o tPublic Sanitary Inspectors*, 1884.

land drainage, street sewerage, house and street cleansing, and water supply were now viewed as a united whole, it followed immediately that 'the consolidation of all the structural arrangements comprising under-drainage, and surface-drainage, road structure and repair under *one service* is most required for the sake of efficiency'.[1] Since, too, 'the extent of the areas to be drained determines arbitrarily the extent of the operations of drainage',[2] the area of this service must be the same as the geological area of drainage. 'Drainage *per se*' would 'be found to be a reduction of an existing charge for the expenses of sickness and mortality'; [3] but '*science* applied to the improvement of drainage not only gives it efficiently, but reduces greatly the expense'.[4] Since 'the local arrangements for the cleansing and drainage of towns' generally presented only instances of 'varieties of grievous defects from incompleteness, want of science or combinations of means for the attainment of the requisite ends',[5] it followed that the officers supervising the new arrangements must be thoroughly skilled in their work. Since the improvements would cost a great deal of money, impossible and unjust to impose on landlords with only short interests in their property, the cost must somehow be spread over a period of years. Lastly, since 'in the poorest districts . . . the superior direction of such expenditure will, in the ordinary course, fall into the hands of the owners of the worse-conditioned tenements who have the greatest dread of immediate expenses, who are under the strongest influence of petty jealousies', the authority must be purged clean of all sinister interests.

The sanitary authorities therefore must administer the whole drainage basin, and undertake all the sanitary services therein. They must be skilled, responsible, and incorrupt. They must possess powers to borrow money, and spread the charge for improvement over a number of years. Were any such authorities in existence? Chadwick ranged indescriminately over improvement commissioners, municipal corporations, and Commissions of Sewers. As he pointed out, their very multiplicity sinned against the principle of local consolidation. But, in addition, he cited a number of terrible instances, to give the impression that in not one of the necessary qualifications were they adequate. They were ignorant, corrupt, lavish; each service was divided among different authorities; drainage areas were arbitrarily severed. They were served by the most incompetent officials; the multitude of specific services each carried its own independent staff. Many services possessed officers who performed exactly the same duties as similar officers in some

[1] *The Sanitary Report*, p. 233. [2] Ibid., p. 303.
[3] Ibid., p. 58. [4] Ibid., p. 58. [5] Ibid., pp. 36–7.

other branch of the service. The cost of their upkeep was prodigious, and the work they botched was appalling. While the country was cheaply and excellently served by the Royal Corps of Engineers from whom some minimum standard of efficiency was demanded, no qualifications whatever were imposed by local authorities on their civil engineers.

If there were no competent authorities in existence Chadwick had to invent them. What he invented was a trifle vague. A precise formulation would not be reached until 1845, when the Health of Towns Committee investigated his suggestion. But in his Report he did make quite clear where his thoughts were centred. There must be new authorities, *nominated* by the Crown, like the Commissions of Sewers, though containing such elected persons as the chairman and vice-chairmen of Boards of Guardians and the 'chief elected officers of municipalities and other authorities now charged with the care of the streets and roads'. Their area of jurisdiction must be the natural drainage basin. Their range of duties must embrace land drainage, sewerage and street cleaning, water supply, and the upkeep of the roads. And lastly, these authorities must appoint as civil engineers only those who, by some public diploma, were admitted to have requisite skill and ability. These officers would arbitrate on local disputes over general land drainage, and put into operation the general clauses which the new authority would be given power to execute.

But who was to provide the enormous sums required for these gigantic structural alterations? And how was it to be levied? Each house must be supplied with a water tank and an apparatus for bringing the water on the premises, with an apparatus for removing refuse, with a house drain, and a share in the main sewer. The immediate outlay per house would not be less than £16. The total outlay on one-third of the existing tenements in the country would cost nearly eighteen and a half million pounds, or a third of the total national annual expenditure.[1] Since the evils were the greater in proportion to the shortness of the owner's interest in his property, it was out of question to compel individual owners to pay for their own improvements. In any case, such a course was undesirable because of the need for large-scale combination of the sanitary services. It would be quite impossible, also, to maintain the obsolete rating practice of the existing authorities. In a terrible indictment of the Metropolitan Commission of Sewers, Chadwick illustrated how rates were being levied on property that was never drained, or raised indiscriminately from those whose houses were, and

[1] *The Sanitary Report*, p. 223.

those that were not, connected with the sewers. In either case they fell upon occupiers whose tenancy fluctuated and so might never feel the benefits of the improvements.[1]

Chadwick avoided the difficulties by suggesting that the works must be executed 'by loans, paying interest on the security of the rates, and spread the charge over thirty years during which the original outlay should be repaid'. 'This', said he, 'would allow the annual instalments being charged in fair proportions to the tenant and to the holders of short interests.'[2] For the sum of 5½*d.* per week per tenant over the period of thirty years, Chadwick promised every class in the community a vast pecuniary gain. Of the 5½*d.* per week he argued that only 1½*d.* could be considered as a new charge, viz. the amount exacted for sewerage. This, Chadwick said, amply repaid the landlord by preserving his houses from the all too-frequent dilapidation caused by faulty drainage.[3]

The benefit to the working people would be enormous. Chadwick ventured a hope that his measures would reduce sickness to at least one-third of the existing amount.[4] Therefore for the 1½*d.* they paid, apart from the inestimable benefits of health, the reduction of payments to sick clubs or to doctors would in money alone save them at least double that amount; and they would actually gain all the earnings of the days when, formerly, they lay incapacitated by sickness.

After disposing of the actuarial problems, only one remained outstanding. So far Chadwick had dealt with the means of carrying out the improvements. But before they were executed, someone must draw the attention of the local authorities to the need for them, and to the places where they were needed. This certainly was not an engineering problem. Somebody must take the place of the moribund courts leet, or 'annoyance juries' which had hitherto drawn the attention of the executive arm to nuisances and had possessed the power to prosecute those who had committed them. In the cholera epidemic of 1832 *ad hoc* Boards of Health had replaced the courts leet, but had proved hardly more successful. Yet, in 1840 a Select Committee of the Commons on the State of Towns, had recommended that such Boards of Health should be set up as permanent advisory committees on sanitary problems.[5] Edwin Chadwick brought against this suggestion the same criticisms which he had made against Normanby's Building Bill, namely, that the only real expert in detecting insanitary conditions was the medical

[1] *The Sanitary Report*, pp. 309 et seq. [2] Ibid., p. 223. [3] Ibid., p. 224.
[4] Ibid., p. 226. Sir George Newman, in his remarkable essay, *The Practice of Preventive Medicine*, suggests that the execution of these improvements between 1848 and 1900 was responsible for reducing *mortality* by one-half. [5] For this Committee, see above, p. 211.

officer of the Union. All experience, he said, in France as well as in England, showed that the efficiency of such boards depended entirely upon how efficiently facts could be brought to their notice. Inexperienced, amateur, part-time, and without expert guidance they blundered along, working hard but achieving little. The medical officer on the other hand was forced by his work to enter into every workman's dwelling. Its repulsive sights or smells could not deter him. It was he and not a Board of Health who should act the part of 'public informer'. Furthermore, he should have some executive authority. He should have the power to get the relieving officer of the Union to prosecute the nuisance.

The difficulty which this suggestion raised has since proved to be the perennial weakness in local public health administration. If the medical officer were a part-time officer, and possessed a private practice, he would fear to condemn as insanitary the houses of a private patient.[1] The small size of the local administrative unit would act, as in the unreformed state of Poor Law administration, as the breeding pool of sinister interests. So, to avoid the difficulty, Chadwick proposed in every drainage district a superior medical officer. He would be recruited by examination. Possibly he might supervize all public medical service within his district—the workhouse and prison medical services, for instance, or the inspection of factories and lodging-houses. His primary function, however, must be the supervision of the local sanitary service.

With this, Chadwick reached the last of his recommendations. Side by side with the new drainage authority he had outlined, there would be a district medical officer to advise it and direct its attention to wherever and whatever affected the health of the inhabitants.

V

The Report was emphatically *not* the last word on the subject of sanitary administration. On the contrary, it was a most tentative beginning. Chadwick's conclusions were general and imprecise. They appeared there as a rather diffident hypothesis, not as a doctrine. For example, neither the constitution nor the duties of the proposed local executive boards were worked out in detail. Their relationship to any

[1] Cf. Report of Committee of Enquiry into the anti-tuberculosis service in Wales and Monmouthshire (H.M. Stationery Office, 1939), p. 140. 'As one doctor put it to us, if he reported upon the bad conditions of a house which belonged to a patient, he could count that one a patient lost, and not only him but every member of his family. If, on the other hand, he reported adversely on the conditions of a house belonging to a person who was not a patient of his, then he was accused of doing so because that person was not his patient.'

central agency, or to the district medical officers, was not even hinted at. Similarly the arterial system was still a hypothesis. *Could* water indeed be supplied in a constant stream? Could it be supplied to all houses at pressure, except at a prohibitive cost? Were John Roe's sewers really practical? Was not Smith of Deanston wrong as to the practicability of liquid manure? Were Chadwick's actuarial calculations correct? To make sure, the opinions of every experienced engineer in the country would have to be taken. The Report was not the last word, but indeed the first, rather hesitant posing of the question. This was why so many Enquiries had to follow it.

The only proposition the Report could be said to prove was the existence of a connexion between filthy environment and disease. The rest was still to be investigated. So the Health of Towns Commission[1] was set up and was led by Chadwick into re-investigating, not the extent of insanitary conditions, but the detailed application of his proposals. The Metropolitan Sanitary Commission worked on exactly the same[2] lines, but inside the particular limits of the Metropolis.

The conclusions reached by these investigations were substantially the same as those adumbrated in the Report. But in this process they were enriched and strengthened and moulded by the great influences now stirring, and the scientific development within the country. The craze for high farming and agricultural improvements, the first successes of industrial chemistry, the awakening science of geology with which Sir Henry de la Beche's name is immemorially connected, the engineering successes of the Brunels and the Stephensons all shed their light on different aspects of the problems of the town. Land drainage and the uses of liquid manure were eagerly supported by the Spencers, and Fitzwilliams, and Fortescues of the Royal Agricultural Society, and these not only lent their experience to the sanitary enquiries, but ranged in support of them a formidable body of the House of Lords. Geology and the new School of Mines marched hand in hand with agriculture and town sanitation. Organic chemistry and the researches of Liebig and Playfair shed new light on the purity of water supplies, as well as putting its scientific learning at the disposal of the analysis of artificial manures and soil composition. The 'how' and the 'where' of land or town drainage was worked out on the authority of the engineers who had built canals, driven tunnels, excavated cuttings and laid rails. All these influences enriched the conclusions of the 1842 Report, though they did not substantially change them.

[1] Health of Towns Commission, 1843–5.
[2] Metropolitan Sanitary Commission, 1847–8.

CHAPTER II

THE FIRST FRUITS OF THE SANITARY REPORT

I

IN the interval between the Report of Slaney's 1840 Committee and the publication of the Sanitary Report another aspect of public health had been brought before the Commons.

At that time the majority of people, and all the poorer classes, were buried in churchyards or the burial grounds of the various sects. The rich were often buried there also, in mausoleums and family vaults: but for this class of people private cemeteries were now being provided on a commercial basis. In London there were now eight of these, all spacious, and situated on the very outskirts of the built-up area.

As London grew, so did its tale of dead; but the number of graveyards did not grow. On the contrary—crowded with corpses like Bunhill Fields where over 100,000 corpses lay in 4 acres of ground—they continued to take the annual burials of vastly expanding populations. In the Metropolis alone, every year added 52,000 bodies to the area of 203 acres which had to suffice! Pestiferous and obscene, they infected the crowded houses around them with the odours of the charnel house.

In March 1842, Mackinnon, (the reporter of the 1840 Committee) moved a Select Committee on Interments. It sat for three months and reported just before the recess. Unwilling to give offence, Chadwick ignored the subject in his Sanitary Report. No sooner had this been published, however, than Graham asked him to prepare a supplementary volume on the burial question.

'In the Metropolis,' Chadwick found, 'on spaces of ground which do not exceed 203 acres, closely surrounded by the abodes of the living, layer upon layer, each consisting of a population numerically equivalent to a large army of 20,000 adults, and nearly 30,000 youths and children, is every year imperfectly interred.' The reeking odours, revulsive, nauseating, crept into the neighbouring houses bringing the stink of death and often its reality.[1]

The *Report on Intra-Mural Interments*, published at the end of 1843, was of all Chadwick's Reports the most grisly and revolting. There

[1] Chadwick thought 'the emanations' 'of a nature to produce fatal disease'. The factor causing death, however, would be the water-polluting effects of such decaying bodies.

were descriptions of such places as Russell Court, near Drury Lane, where the ground, raised several feet by continuous burials was 'a mass of corruption' which poisoned air and water alike; or that place in Rotherhithe where 'the interments were so numerous that the half-decomposed organic matter was often thrown up to make way for fresh graves, exposing sights disgusting, and emitting foul effluvia'.[1] There were horrible descriptions of corpse wakes; of dead bodies remaining days and days before burial in the one room which served the family for dining and sleeping alike; of children sleeping, or trying to sleep, under the eyes of a dead man. There were descriptions of child murders committed to realize the moneys invested in the burial club. Chadwick had also to describe the burial of corpses under the flags of the churches, so that however well-coffined, 'sooner or later every corpse buried in the vault of a church spreads the products of decomposition through the air which is breathed, as readily as if it had never been enclosed'.

This Report was also the most far-reaching in its recommendations. It was the sole Report which he drew up exactly as he wished it, and he always referred to it afterwards as a model of what such Reports should be. Its recommendations alone would have shown that Chadwick had a free hand. Mackinnon's Select Committee had not suggested more than that intra-mural interment should be prohibited and that municipalities should have power to make cemeteries on their outskirts. Chadwick outran these proposals.[2] He wanted all cemeteries to be municipalized. All the 'trading cemeteries' were to be abolished. The religious rites and ceremonies were to be simplified and standardized. With the frequency of child murder in mind, he vehemently arraigned the existing registration of deaths, suggesting (what he had always wished to see) the verification of the fact and cause of death by medical officers before the burial of any corpse. In 1843 these suggestions might remain a dead letter. In 1848 many were incorporated in the Public Health Bill; and in 1851 Chadwick tried to set up his nationalized cemetery for the Metropolis.

The Report was not published till the last month of 1843. During that time an event of far greater importance to the sanitary cause had taken place. Chadwick's impatience when the Sanitary Report produced no legislative results; the pressure of the small but influential band of parliamentary enthusiasts for public health; Graham's promise to the House that he would reintroduce Normanby's Building Bill in the

[1] Quoted Jephson, *The Sanitary Evolution of London*, pp. 36–7.

[2] I have dealt over-summarily with these conclusions because in chapter 2 of Book IX below, I describe in detail the 1850 Act, which tried substantially to give effect to them.

1843 session; all these influences pressed the Peel Government to take some action. But the revolutionary displacement of water companies, landlords, engineers, and the Commissions of Sewers which Chadwick's Report portended, urged caution. A Royal Commission was announced. Ostensibly its function was to re-examine Chadwick's recommendations, in practice its work was to elaborate.

This Royal Commission, the Health of Towns Commission, was the basis for all the subsequent legislation of the 'forties and 'fifties. Its mighty successor in 1869 only reaffirmed its findings.[1] It was to sanitary science what the 1834 Poor Law Report was to public assistance. Its relations to Chadwick's Sanitary Report of 1842 paralleled exactly the relationship between the Poor Law Report of 1834 and Chadwick's individual Report of 1833. In both cases, Chadwick's individual Report outlined the plan that was later adopted by the Royal Commission. In both Chadwick played the dominant part in the Royal Commission's deliberations and drafted most of their Report. In both, the operative portions of the plan were his own. And in both, he had to wait for a posthumous fame, which should disengage the part he played from that of the others and show how masterly it was. In defining the objects of this Enquiry, the nature and mode of its operation, and in the writing of its Report, the voice was Chadwick's, and often the hand also.

Graham, bitterly suspicious and hostile to Chadwick over the Poor Law questions, followed his advice in Sanitation. He was not named on the Commission. Ostensibly indeed, the Commission was there to put Chadwick in the dock. Nevertheless it was his outline of the scope of the Enquiry which was followed. On 15th March, Graham requested Chadwick's opinion on the enquiries the Royal Commission should undertake: and he followed Chadwick's Memorandum very closely. The general principles of his Report were not to be questioned by the Royal Commission. Instead, the Commission was to demonstrate the various means for applying these principles. It was to see whether stone water-spouts would be better than zinc ones, whether glazed-stone drains would be better than brick drains, it was to find the correct draft and inclination of sewers, to examine the possibility of supplying water at constant supply and under high pressure. It was to elaborate the details of the public administration.[2]

Chadwick was also asked to submit 'names that carry weight'. The rationale of his choice afforded a singular illustration of his views on

[1] Cf. Sir George Newman, *Outline of the Practice of Preventive Medicine* (H.M. Stationery Office), pp. 16, 17.
[2] Edwin Chadwick to Sir James Graham, 15th March 1843.

the nature of public health administration: it was a matter for engineers and lawyers. Medical men were to be appointed only to point out the evils. 'It is an important impression to extend,' he wrote, 'that *drainage* is a matter of science, or its practical application and not of more common sense or general knowledge.' Among the engineers, he proposed Sir Henry De La Beche, because he conducted the Geological Survey; Captain Denison, because of his position at the Woolwich School of Engineers; Professor Airy, the Astronomer Royal, because his knowledge of hydraulics could throw light on fluid pressure; Professor Farraday, 'as one of the first analytical chemists', to conduct analyses of drinking water; Stephenson junior and Brunel junior because they were railroad engineers; and Smith of Deanston, the great scientific agriculturalist, because of his knowledge of land drainage and manures. Chadwick's list of 'medical' Commissioners was similarly illustrative. He suggested that Professor Richard Owen, the physiologist, should come on the Commission; Sir James Clark also, because in his work on 'climate' he had studied the effect of atmosphere in towns on public health. Chadwick also suggested Dr Arnott, because of his work on ventilation.[1]

Graham accepted about half of Chadwick's nominations and told the Commission to follow his plan, that is, to investigate the practicability of the Sanitary Report. It heard reports from fifty of England's largest towns, which contained between them a sixth of the entire population. Synopsised, its findings corroborated and implemented Chadwick's. The selection of witnesses alone was sufficient to carry them along that particular path Chadwick had struck, directed well away from curative medicine as it was, and limited to the field of engineering.[2] Of its medical witnesses, certainly Doctors Arnott, Smith, Guy, and Toynbee were all confirmed believers in the preventibility of disease by the improvement of environment. Of the sixty-five witnesses, fourteen were surveyors or Commissioners of Sewers, ten were registrars or Poor Law officials, nine were engineers, six were architects, and one, Hawkesley, was a water works engineer.

The preventibility of disease by engineering rather than by curative medicine was confirmed by the reports of Smith, Arnott, and Toynbee. Indeed the latter's evidence was to Chadwick 'an important advance', because he 'brought scrofula home to defective ventilation'. (!) The statistical verification of the causes of disease was advanced by the reports

[1] Edwin Chadwick to Sir James Graham, 15th March 1843.
[2] Second Report of Health of Towns Commissioners (octavo ed.), p. 3: 'We have endeavoured as far as possible to avoid the discussion of the theoretical causes of disease'

of Clay on Preston, Dr Laycock on York, and Hawkesley on Nottingham. To his mind, the proof that soil-pans and water-closets were cheaper than hand cleaning of cesspools was put beyond any doubt by the reports of Strett Foden and Dyce Guthrie. Liquid manure application was further elaborated by the evidence of Dean, Guthrie, and especially of Captain Vetch, and by the proof that it could be distributed by hose and jet under high-pressure water. Most of all, the evidence of Hawkesley filled Chadwick with jubilation. At this moment he swore by Hawkesley, though later the two men would be the most bitter enemies. For Hawkesley had proved the efficiency and economy of 'constant supply' on the proof of which all the rest depended. With his evidence the venous system was proved practical. The serpent's tail had come to rest in the serpent's mouth.[1]

Now it is not at all surprising that the Commissioners should have confirmed all of Chadwick's views, for although they were the most creative brains of their time in their own particular fields of work, their work was just what made it likely that they would approve such views.[2] But the more obvious reason was that Chadwick directed the whole work of the Enquiry, of which the selection of witnesses was only one part! 'Though not named in the Commission', he told Napier, 'the Commissioners having their own occupations to pursue, it was found that the subject could not be mastered as an *incident* to others, and *I was compelled to attend to it, write their questions, take the examinations and prepare their Report,*[3] *so that nearly two-thirds of these volumes are in my hand-writing.* for which I am to get only posthumous credit, if at all.'[4]

'My vacation has been absorbed', he wrote, 'in visiting with Mr Smith and Dr Playfair the worst parts of some of the worst towns. Dr Playfair has been knocked up by it and has been seriously ill. Mr Smith has had a little dysentery. Sir Henry De La Beche was obliged at Bristol to stand up at the end of alleys and vomit while Dr Playfair was investigating overflowing privies. Sir Henry was obliged to give it up.'[5]

In planning and conducting the Enquiry, he was the habitual assistant of the Chairman and Secretary, he 'precognized' all the witnesses for

[1] For this paragraph see Edwin Chadwick to Lord Francis Egerton, 1st October 1845. Edwin Chadwick to M. Napier, 12th October 1844. Edwin Chadwick to L. Faucher, 3rd November 1844.

[2] Edwin Chadwick to Lord Morpeth, 18th September 1848. The only serious dissentient on the Board of Commissioners was Robert Stephenson. His report on the water supply of the Metropolis was, so Chadwick said, 'so erroneous in principle (and) so much at variance with the evidence we had received from witnesses, that by a general concurrence Mr Stephenson was induced to withdraw his document'.

[3] This was the First Report. [4] Edwin Chadwick to M. Napier, 12th October 1844.

[5] E. Chadwick to Major Graham, N.D., 1843.

examination, accompanied several of the Commissioners in their tours of inspection, and when the Commission reported, its First Report and the Recommendations of the Second were of his drafting.[1] It was, then, not mere courtesy which prompted Lord Buccleuch, the Chairman, 'to bear full and willing testimony to your great exertions, constant attendance and most valuable information and assistance which you rendered to the Commission'.[2] Neither was it surprising that, as Chadwick triumphantly announced, the Commission 'has recently made an important Report which is in all important points, indeed on every point confirmatory of the view taken in the Sanitary Report'![3]

II

The Commission, together with a mass of evidence, presented two reports, the first in July 1844 being of an interim nature, the second, in February 1845, embodying its conclusions. These recommendations were so significant in the development of public health, that the Royal Commission of 1869–71 reprinted them in full. But they have also a narrower interest as profoundly affecting the immediate future of the public health agitation, and they especially explain the individual twist which Chadwick gave the movement over the next ten years.

In the first place, they illustrate Chadwick's obsession with the sanitation of London, an obsession that was to grow upon him until in the end, more than any one thing, it brought about the end of his public career. His private correspondence with Graham and others in early 1843 as to the scope of the Royal Commission would almost lead one to suppose that its first purpose was to discredit the sanitary authorities of London, and, in particular, the Westminster Commission of Sewers.[4] Certainly the Report triumphantly underlined the criticism he had made in his 1842 Report. The Commission made the investigation of London their first task. They interviewed the Chairman and chief officers of the Metropolitan Commissions of Sewers, heard evidence from Dr Arnott and Dr Southwood Smith on the low sanitary condition of Metropolitan districts, and conducted elaborate investigations into the Metropolitan water supplies. The result was damning. The *system* of administration was shown to divide a natural drainage area into eight arbitrary compartments and to divorce house drainage from the sewerage.

[1] Cf. Simon, *Sanitary Institutions*, p. 198.

[2] Buccleuch to Edwin Chadwick, 17th December 1845.

[3] Edwin Chadwick to Napier, 17th August 1844.

[4] Edwin Chadwick to Graham, 12th May 1843. E. Chadwick to Hobhouse, 21st January 1843.

The *practice* of administration was shown to be extortionate, inefficient and corrupt: the first was proven by evidence as to the oppressive and inequitable rating system used by the Commissions of Sewers, the second by their refusal to copy the improved and less expensive methods of the Finsbury Commission, the third by astonishing revelations of peculation in the Westminster Commission. The Report also stressed that the water supply (needed to scour the drains and flush the sewers) was supplied by private companies on a costly intermittent system at exhorbitant prices and in quite inadequate quantities. From this moment Chadwick became fired by the desire, above all other things, to consolidate under one Crown-appointed Commission the drainage, sewerage, street cleansing and water supply of the whole gigantic Metropolitan area; and himself to have the handling of it.

Secondly, the Royal Commission marks the completion of Chadwick's thought on sanitation. As far as he was concerned, the 'venous, or arterial system of town drainage', even the practicability of such barely tried appliances as earthenware pipe drains or the jet system of distributing liquid sewage, were now *proved*. So too were the administrative hypotheses put forward at the conclusion of the 1842 Report. These very general principles were now expanded into a memorandum of December 1844 [1] and—couched in terms of acceptable generality and vagueness—they then appeared as the Recommendations of the Royal Commission. From these he never departed, and in 1846, before the Select Committee on Private Bills [2] and the Select Committee on the Sewage Manure Company,[3] it is already evident that Chadwick was speaking with a closed mind.

Thirdly, the Commission provided magnificent material for propaganda; it is significant that the *Health of Towns Association* should not have been formed before December 1844. The Reports contained, first of all, details on the condition of the fifty most unsanitary towns of England, possessing in the aggregate three million inhabitants. They also contained special reports on Liverpool, Preston, Nottingham, Leicester, York, and Huddersfield. This was valuable ammunition for the provincial public health agitation. Next, the Reports provided an actuarial calculation which purported to show that sanitation was cheap—in some cases cheaper than the existing system. The impression was given that 'to proceed wholesale was the cheapest mode', that the complete consolidated system proposed by the Commission, including unlimited water *and* the salary of a Medical Officer, could be had for

[1] For this Memo., see below, pp. 302–5.
[2] Parliamentary Papers, 1846, xi, Qq. 249–346.
[3] Idem., 1846, x.

a mere 3½d. per week on the rent![1] Finally, it provided, in its recommendations, a specific programme for which the reformers could press.

The last and most important of the immediate results of the Royal Commission was that once having reported, it threw the onus squarely upon Government. The Second Report had been hurriedly produced in February 1845, in the hope that immediate legislation would follow. From this point, neither Whigs nor Tories could evade the obligation to introduce a measure. It was pressed upon them by a large and growing body of public men, organized in a number of voluntary associations.

III

The creation of this outdoor public opinion began in earnest in 1844, when a number of associations were formed, the *Association for Promoting Cleanliness among the Poor*, the *Society for the Improvement of the Conditions of the Labouring Classes*, and the *Health of Towns Association*. The first aimed to set up Baths and Wash-houses; among its more active members were John Bullar and Baillie Cochrane. The second aimed at providing model dwellings for a nominal return of 4 per cent.: Ashley and Southwood Smith were its chief promoters. Chadwick testily refused to have anything to do with it. Four per cent. was a 'benevolent' rent, not a competitive one. 'A return of a commercially remunerative rent . . . would be of great practical importance to the working classes whereas the success of buildings at a half-rent would have been of no value in the way of imitation.' [2]

The third body, the *Health of Towns Association*, was an avowed propagandist body, and it proved of capital importance. It was formed at a public meeting on 11th December 1844

> 'for the purpose of diffusing among the people the information obtained by recent enquiries, as to the physical and moral evils that result from the present defective sewerage, drainage, supply of water, air and light, and construction of dwelling houses: and also for the purpose of assisting the legislature to carry into practical operation any effectual and general measures of relief, by preparing the public mind for the change.' [3]

The Association comprised a host of local associations spread throughout the provincial towns with a central committee meeting in London.

[1] *Health of Towns Association*: Abstract of proceedings of a Public Meeting, held at Exeter Hall, 11th December 1844. Chas. Knight (London, 1844). Price 2d.
[2] E. Chadwick to Arthur Helps, 3rd November 1844.
[3] *Health of Towns Association*: Abstract of Proceedings, 11th December 1844.

The local bodies worked by disseminating facts and figures drawn from the official reports; by organizing public lectures on the subject; by reporting on the sanitary problems of their district, and by organizing public meetings to petition Parliament. 'It is only by "pressure from without",' cried a speaker at its inaugural meeting, 'that anything useful can be accomplished, and petitions must be poured in in order to awaken the Legislature from the torpor to which it is habitually addicted.'[1]

A typical example of the way in which the London Association went to work is provided by the following minute :—

'COPY OF RESOLUTIONS

'Resolved that a sub-committee be formed to examine and report on the Provisions of the Metropolitan Building Act : and which of them are conducive to Sanitary improvement and at what expense and whether any and what improvements may be recommended therein.

'That W. E. Hickson, Esq., be requested to act on such sub-committee and that a conference and observations be requested from the Builders Society.

'That a circular be written to the known supporters of Hospitals and Medical Charities requesting their support in the work of the Association which combines with the charity of alleviation the charity of prevention.

'That the chairman and Dr Southwood Smith be requested to prepare a circular, the chairman to sign a lithographed copy to be sent out under their direction.'[2]

Chadwick was not a member of the Association. He was pressed to join but refused, legitimately, on the grounds that he was a public servant—and one, moreover, who was officially enquiring into the very matters the Association was promoting. But though no member, he was in fact a leader of the Association. Southwood Smith, a member of the Central Committee, was the intermediary, and through him Chadwick suggested the action of the Association, provided it with information, and wrote many of its reports. For example, the very 'Copy of Resolutions' quoted above is written in Chadwick's hand-writing and naively endorsed: 'To Dr Southwood Smith, and *by* Edwin Chadwick!' In 1846 the Association produced a most important *Report on Lord Lincoln's Sewerage and Drainage of Towns Bill*: most of the report exists in a draft in Chadwick's hand-writing!

The most striking feature of the Association was its comprehensive social and political basis. On its Committee of 1844 the aristocracy (represented by Normanby, its chairman, and the Earl Lovelace) and the

[1] *Health of Towns Association*: Abstract of Proceedings, 11th December 1844.
[2] E. Chadwick to Dr S. Smith, N.D., 1847.

Bishops (represented by London, St Davids and Norwich) sate cheek by jowl with W. E. Hickson, the tradesman's son, and John Leslie, the tailor of Conduit Street. The doctors were represented by John Simon, Joseph Toynbee, and R. D. Grainger, the clergy (apart from the Bishops) by one Archdeacon and three Reverends. Most surprising, however, was its political composition. Prominent Whigs were there, like Normanby and Morpeth, side by side with Young England in the persons of Disraeli and Lord John Manners; radicals like Hawes and Sheil spoke on the same platform as Sir Robert Inglis and Lord Ashley.

This was of the greatest personal importance to Chadwick. His connexion with the Poor Law had isolated him. The Association now brought him a band of increasingly devoted supporters. Normanby and he granted one another a mutual amnesty. Even more striking was his new relationship to Lord Ashley and to Charles Dickens. Here was Ashley's arch-enemy—the man who had made his factory legislation impossible, the man who that very year had been stiffening the Ministers' resolve against his Ten Hours Bill; yet within a few months of the Exeter Hall meeting Ashley had so far sunk his resentment as to plead with Ministers to give Chadwick the post of Commissioner in Lunacy! Dickens was harder to win over. The intermediary was Henry Austin, a young engineer, the novelist's brother-in-law. Austin, who had written a paper for Chadwick's 1842 Enquiry, in 1844 became the Secretary of the Health of Towns Association. Dickens still continued to mistrust Chadwick's part in Poor Law administration and it was not till 1847 that he was quite won over: but from that time onwards he became his most outspoken public champion.

IV

The Second and final Report of the Commission appeared in February 1845. Up to that date the Peel Government would go no further than to replace Normanby's Building Bill of 1840. A new measure was suggested in 1843, just as the Commission was set up, but Chadwick violently attacked its principle and its drafting. It was worse even than Normanby's measure. 'It will', he said, 'needlessly multiply offices and . . . its machinery will stand in the way of improvements required in the machinery for improved sewerage and supplies of water.[1] In 1844, when its offending shape was dragged out of storage in yet another

[1] Edwin Chadwick to Sir James Graham, 12th May 1843.

attempt to foist it on the House, Chadwick went hand in hand with the newly founded Health of Towns Association in raising public criticism against it.[1] He despaired of forcing the Government to carry an adequate Public Health Bill. 'The evidence presented, two years ago, as to the effects of the overcrowding of dwellings and the consequent demoralization,' he asked, 'what place does it occupy in the discussions in the House? . . . The fact is there is a great aversion to any such Enquiries on the part of many members of both Houses and of influential people out of them.'[2]

But in 1845 when the Report was presented, a flicker of hope reanimated him. The Queen's Speech of that year announced the introduction of Sanitary legislation. Surely now, at last, the Government would pass a measure based on his recommendations. Alas! Peel's action was the most timid compromise. Lord Lincoln, his Commissioner of Woods and Forests, did indeed introduce a measure based on the Report. It was an extremely far-reaching measure, and Chadwick, acting through the Health of Towns Association, published in their name a criticism of its weaknesses, hoping that since the principle of the Bill was admitted, it might be moulded to the shape he desired. There indeed was the rub. The Government had no intention of passing the Bill. Lincoln introduced it with the avowed purpose of postponing it until the session of 1846, by which time the Commons would have had time to deliberate on the matter amongst themselves. Chadwick was disgusted. Furthermore, Graham positively refused to go on with the Interments measure, and when (on 8th April) Mackinnon put up a resolution condemning intra-mural interments, he openly supported the existing system. Although Mackinnon beat Graham on the division by 66 to 49, the Government refused to alter its attitude.

Chadwick waited impatiently for the 1846 session, and while he waited, a novel thought struck his mind. What was needed for providing arterial drainage to towns, but large-scale capital? And if Government would not take measures to provide it, why should not private persons do so? 'My belief is', he said tentatively, 'that these supplies may under proper regulations be supplied as subjects of commercial enterprise than by Government, much cheaper and better for the community.'[3] 'I fear', he told another, 'that we must wait until large capital is applied to the construction of the dwellings of the working classes, until their dwellings become a manufacture, before we

[1] Undated memorandum, 1844.
[2] Edwin Chadwick to A. Symonds, 18th July 1844.
[3] To M. Faucher, 3rd November 1844.

get the requisite improvement in those made at a cheap rate—and we shall get large capital from several before we get it from one capitalist. . . . The more I go on, the more clearly does it appear that every step in actual improvement is a step in the lowest pecuniary economy; despairing of getting anything effectually done by municipalities, I am trying whether Joint Stock Companies cannot be got to undertake improved supplies of water as renters or lessees for terms of years instead of as proprietors.'[1]

This was the birth of Edwin Chadwick's singularly ill-fated venture into private business, the 'Towns Improvement Company.' Apart from its farcical misadventures, the projected company illustrated clearly the sharp divergence between Chadwick's views on sanitation and the timidity of the Government. For a few months Chadwick worked beneath the surface. He drew into support of his scheme such men as Larpent, the millionaire; Morrison, the railway projector; Sir John Easthope, the stockbroking proprietor of the *Chronicle*; Currie, the 'Nabob' who had brought an enormous fortune from India. Hawkesley and Smith of Deanston agreed to act as the company's engineers. Lord Francis Egerton was made chairman of the company, and together with Chadwick, Dr Arnott, Rowland Hill, and Nassau Senior came in as its provisional directors.

With this backing, in 1845, there burst upon a world intent on railway speculation, the Towns Improvement Company, to carry out 'the recommendations of Her Majesty's Commissioners on the Health of Large Towns . . . and for effecting . . . the most important provisions of Lord Lincoln's Bill'. Its boldness, compared with the Government's pusillanimity, was to be seen in its ambitious programme for Manchester. It was to supply 'an increased and well-distributed supply of pure water, a complete system of house and street drainage, the removal of middens, cesspools, and all accumulations of decomposing filth and other organic matter, and the purification of the rivers'.[2] In the means by which this was to be carried out the entire recommendations of the Health of Towns Commission were to be put into operation.

Chadwick laboured on this scheme throughout the whole of 1845. Indeed, he laboured on little else, and with fortunes that will be told elsewhere. Then came 1846, the year when Lord Lincoln's Bill was to be reintroduced. The new year broke, but not upon any sanitary enactment. It saw instead the year of the Irish Famine and the nation-wide convulsion over the Corn Laws. It saw Lincoln's Bill put aside and

[1] Edwin Chadwick to Arthur Helps, 3rd November 1844.
[2] Cf. Redford, *History of Local Government in Manchester*, vol. ii, p. 141.

Chadwick angrily crying to Ashley that 'if we are idle, death is not'. It saw the collapse of the railway mania and with it the shipwreck of the Towns Improvement Company. And it saw the termination of the long, sordid history of squabbles inside the Poor Law office in one violent passage between Chadwick and Lewis after which the Commission survived no more.

BOOK SIX

ANDOVER

CHAPTER I

ALL IS NOT WELL AT THE POOR LAW OFFICE

IT is surprising to realize that during these four years Chadwick still held the position of Secretary at the Poor Law office. Why he was never dismissed is an interesting matter for speculation. Head and Lewis were not above discussing whether or not he would leave the office in disgust, but they never went so far as to consider removing him.[1] Probably Graham stood in their way; and if he did so, we may be sure that it was out of no love for Chadwick but doubtless from a wholesome fear of what embarrassing secrets the offended ex-Secretary might reveal.

So for full five years Chadwick occupied a totally anomalous position, in the Poor Law office but not of it. His room was in a different part of the building and separated from the Commissioners' offices, and had no access to them. Reached by a separate staircase, it was a room where (as Sir Frankland Lewis picturesquely put it) he could have received half the deputations of London without the Commissioners' knowing of it.[2] His labours were becoming as distinct from Poor Law matters as his office was from the others. Sanitary problems (if we may adapt Kant), even if they had begun with questions of the poor rate, certainly did not all arise from them; and with each successive Report Chadwick was carried further away from his originally narrow interest in 'keeping the rates down' into the larger and more humane field of the general prevention of disease. The new science carried him along with it into the baser details of a hitherto unexplored sphere of administration, as he turned increasingly from consolidated orders and rating regulations to the novel and revolutionary consideration of the best methods of sewerage, the latest American street-sweeping machine, and the diameters of drains. As the days passed he spent less and less time at the office itself. Sometimes he would absent himself for the day, sometimes for

[1] Andover Enquiry: evidence of E. Head, Qq. 15,096–7.
[2] Ibid.: T. F. Lewis's evidence, Q. 22331.