

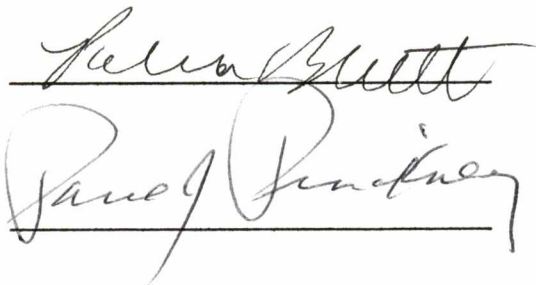
To the Graduate Council:

I am submitting herewith a thesis written by Scott Edward Roney entitled "Effacing the Blots on their Otherwise Fair Escutcheon: Problems of Public Health in Leicester 1849-1891." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in History.



John Bohstedt, Major Professor

We have read this thesis
and recommend its acceptance:



Accepted for the Council:



Associate Vice Chancellor and
Dean of The Graduate School

**EFFACING THE BLOTS FROM THEIR OTHERWISE FAIR ESCUTCHEON:
PROBLEMS OF PUBLIC HEALTH IN LEICESTER 1849-1891**

A Thesis
Presented for the
Master of Arts
Degree
The University of Tennessee, Knoxville

Scott Edward Roney

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ABSTRACT

This study concerns two public health problems in Victorian Leicester: sewerage and 'summer diarrhoea.' The problems are considered to have been constructed socially as well as materially. While neither problem was unique to Leicester, there were circumstances which made the town's responses to the problems unique. The methodological lens for the study is a quasi-Kuhnian conceptualization called an 'accepted remedy.' It is posited that the existence or absence of a consensually-held accepted remedy for a specific public health problem was a significant factor in determining how a community would respond to the problem and how successful such a response might be. Relying on archival data from local politicians, national bureaucrats, local and medical presses, and other interested parties, it can be said that Leicester acted about twenty years in advance of an accepted remedy on sewerage problems and that no accepted remedy for 'summer diarrhoea' arose during the period 1849-1891. Leicester's precocity with regard to sewerage resulted in an expensive failure and an unwillingness to reinvest in a system that would comply with the accepted remedy once it became widely held. 'Summer diarrhoea' remained too complex a phenomenon to yield to an accepted remedy and became a subject of theory, investigation, frustration, and thousands of infant deaths in Victorian Leicester. It is recommended that the concept of an accepted remedy be applied to other historical problems in public health to see if it is a tool that aids understanding.

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LIST OF ABBREVIATIONS

<u>LC</u>	The <u>Leicester Chronicle</u> , after 1864 the <u>Leicester Chronicle and Mercury</u>
LRO	Leicestershire Record Office
Minutes	<u>Common Hall Books</u> , Minutes of Town Council (Leicester)
MOH	Medical Officer of Health
<u>MOH 18xx</u>	Annual Reports of the Medical Officer of Health for the corporation of Leicester
PP	Parliamentary Papers

1. Introduction

Studies of public health in nineteenth century Britain have appeared with increasing frequency since the 1980s. Works of this nature tend to blur distinctions between medical history, social history, and political history especially as regards local government. In that sense this study is not unique. What is different about this study, though not unprecedented, is the focus on specific problems of public health in a particular locality. I am not attempting a sweeping survey of public health in Leicester despite the potential value of such a study. Rather I have chosen two problems, sewerage and summer diarrhoea, that were of particular significance to the townspeople, their leaders, and interested observers.

Sewerage and summer diarrhoea had to be dealt with to a greater or lesser extent by all Victorian towns. In the case of sewerage Leicester was bold and precocious, acting before any kind of consensus was formed on an effectual way of dealing with the problem. This early adventuresomeness made the town's leaders much more timid as it became clear that the remedy they chose had not solved the problem. Diarrhoea appeared to cause "excess" infant mortality. Theories about its causes and prevention came and went throughout the period but no effective solution emerged. The town's leaders and agents were forced to act or give the appearance of acting because Leicester became notorious for its infant diarrhoea mortality. I will suggest that Leicester's responses to these problems would have been less traumatizing to the town if they had been initiated under the umbrella of an accepted remedy, to be defined in a moment.

This study has implications beyond the boundaries of the borough of Leicester for three reasons. First the problems were not unique to Leicester even if they were handled uniquely or in other ways they were especially acute in Leicester. Second the problems demanded responses and potential responses were limited by, among other things, the state

of medical and technological knowledge without relation to a specific locality. Third these problems illustrate the value of looking at public health problems in their contextual relationship to the existence or absence of an accepted remedy.

Within the last few decades the themes of public health histories have evolved from an heroic interpretation of the actions of reformers in the central government toward the reactions in communities by the populace, the politicians, and the medical practitioners. Early works such as S.E. Finer's, The Life and Times of Sir Edwin Chadwick (1952), provided an important exposition of the motives and methods of the metropolitan Benthamite reformers.¹ Recognition of their accomplishments led to a historiographical debate on the pervasiveness and influence of Benthamism on social reform by such authors as Oliver MacDonagh and Henry Parris.² In my opinion this debate was brought to a satisfactory conclusion by Anthony Brundage who argued that Benthamism never attracted a great many adherents but those individuals who subscribed to its tenets were energetic and made their way into positions of responsibility that enabled them to have an influence far beyond their numbers.³ We will encounter evidence of the utilitarians' influence later in this study with regard to the seemingly curious notion of "sewage for profit."

M.W. Flinn, in addition to editing some of the classic Victorian studies on public health for modern reprinting, argued convincingly in the 1960s that too narrow a focus on the leaders in London obscured the discrepancies between the goals implied in acts of Parliament and their implementation in the provinces.⁴ Flinn's concerns about the

¹ S.E. Finer, The Life and Times of Sir Edwin Chadwick (London: Methuen & Co., 1952).

² Peter Stansky, ed., The Victorian Revolution: Government and Society in Victoria's Britain (New York: New Viewpoints, 1973).

³ Anthony Brundage, England's "Prussian Minister": Edwin Chadwick and the Politics of Government Growth, 1832-1854 (University Park, Pa.: Penn State University Press, 1988).

⁴ M.W. Flinn, introduction to Report on the Sanitary Condition of the Labouring Population of Great Britain by Edwin Chadwick [1842] (Edinburgh: Edinburgh University Press, 1965); Alexander P. Stewart and Edward Jenkins, The Medical and Legal Aspects of Sanitary Reform (London: Robert Hardwicke, 1867; reprint with an introduction by M.W. Flinn, Leicester: Leicester University Press, 1969).

overemphasis on the "great men" of the public health movement resonated with later authors such as John M. Eyler whose work on Dr. William Farr was less a biography than it was a history of medical thought and its application to public health.⁵

Public health history of the nineteenth century, as opposed to medical history, is concerned with large numbers of people and therefore tends toward a concentration on the afflictions of the working classes. In the late 1970s F.B. Smith brought a social historian's understanding of the informative value of statistics together with a medical historian's appreciation of practitioners and etiology to produce The People's Health 1830-1910 which can be considered to be something of a patient's perspective on medical history.⁶ This book, and Smith's later work, illustrate a commitment to bring health issues into the dialogue about the working classes on a firmer foundation than studies which allude to health tangentially or impressionistically.

In the tradition of Smith's bottom-up perspective and mindful of Flinn's admonition to look beyond the metropolis and its heroes, Anthony S. Wohl's Endangered Lives: Public Health in Victorian Britain (1983), remains the most compelling and suggestive book in the field.⁷ Wohl's masterful use of prose and his obvious compassion make this book the finest primer for the field but his insightful use of the reports of the Medical Officers of Health (MOHs) make the work an impressive scholarly effort as well. A Medical Officer of Health was a local official, a physician or surgeon, who was appointed by the town government to gather information about conditions and problems and to institute or recommend ameliorative practices within their jurisdictions. They were also obliged to make annual reports to the central government regarding the state of public

⁵ John M. Eyler, Victorian Social Medicine: The Ideas and Methods of William Farr (Baltimore: Johns Hopkins University Press, 1979).

⁶ F.B. Smith, The People's Health 1830-1910 (London: Croom Helm, 1979).

⁷ Anthony S. Wohl, Endangered Lives: Public Health in Victorian Britain (Cambridge, Mass.: Harvard University Press, 1983).

health in their towns. MOH reports from Leicester are a key component of the source material for the current project and indeed it was undertaken in part because of Wohl's call for more local studies.

Another respondent to Wohl's call, Christopher Hamlin, produced a 1988 study "Muddling in Bumbledom: On the Enormity of Large Sanitary Improvements in Four British Towns 1855-1885."⁸ By his comparative method Hamlin developed something of a model to explain the motivations behind local authorities' initiations of sewerage systems. In the towns which Hamlin studied the authorities were compelled by court injunctions to undertake such projects in order to lessen river pollution. The current study is influenced by Hamlin's work not merely to provide an exception to the model but to try to understand what happened to an exceptional, in this case precocious, town. It has often been suggested that provincial towns were recalcitrant in matters of public health but Leicester was energetic and to an extent suffered for its energy.

Another historiographical theme that has received recent attention is the question of whether the nineteenth century public health movement was truly successful in matters of preventive medicine or if improvements in health and mortality were actually due to economic factors, especially better nutrition. Anne Hardy's important new book, The Epidemic Streets: Infectious Disease and the Rise of Preventive Medicine, 1856-1900, is a strong affirmation of the value of the MOHs and the positive impact of preventive measures.⁹ Her work covers eight particular diseases yet omits diarrhoea. The current project takes up the issue of diarrhoea not specifically to find an exception to her thesis but because it was such a locally significant topic in Leicester. Leicester's particularly high level of mortality from diarrhoea does indeed identify a "disease" that resisted all Victorian

⁸ Christopher Hamlin, "Muddling in Bumbledom: On the Enormity of Large Sanitary Improvements in Four British Towns, 1855-1885," Victorian Studies 32 (1988): 55-83.

⁹ Anne Hardy, The Epidemic Streets: Infectious Disease and the Rise of Preventive Medicine (Oxford: Oxford University Press, 1993).

preventive measures but it is the exceptional character of this "disease" that warrants detailed exposition in this study. I would agree with Hardy's belief that great strides were made in public health due to the practice of preventive medicine yet success against other diseases only highlights how diarrhoea was the center of a socially constructed dialogue during this period. While preventive measures were proving efficacious for other diseases frustration grew about this malady and eventuated in castigation of the town where it was perceived to be most prevalent.

About eighty-five miles north of London, Leicester is a town with ancient roots. It is a town where the ruins of Roman baths share stones with a still functioning church of Saxon and Norman construction. The River Soar generally meanders through the borough but was subject, a century ago, to periodic flooding that could inundate the lower portions of the town (see figure 1.1). At the beginning of the nineteenth century Leicester was home to some 17,000 people; by 1851 the population had risen to 60,642; in 1891 there were 174,624 inhabitants. A significant borough extension within 1891 explains only a fraction of the population growth, the rest coming from in-migration and a high birth-rate.

Leicester was a center for hosiery manufacture throughout the period and a burgeoning shoe-making industry especially after 1850. Bill Lancaster enumerates the difficulties of assessing the importance of factories in Leicester but it would seem that some patterns can be discerned.¹⁰ Workshops for hosiery manufacturing were replacing the putting-out system of home production from the 1840s but the shift was neither rapid nor universal. Moreover factories came on the scene rather late in both industries being phenomena of the 1870s and 1880s. According to Nancy Osterud the transition to

¹⁰ Bill Lancaster, Radicalism, Cooperation and Socialism: Leicester Working-Class Politics 1860-1906 (Leicester: Leicester University Press, 1987).

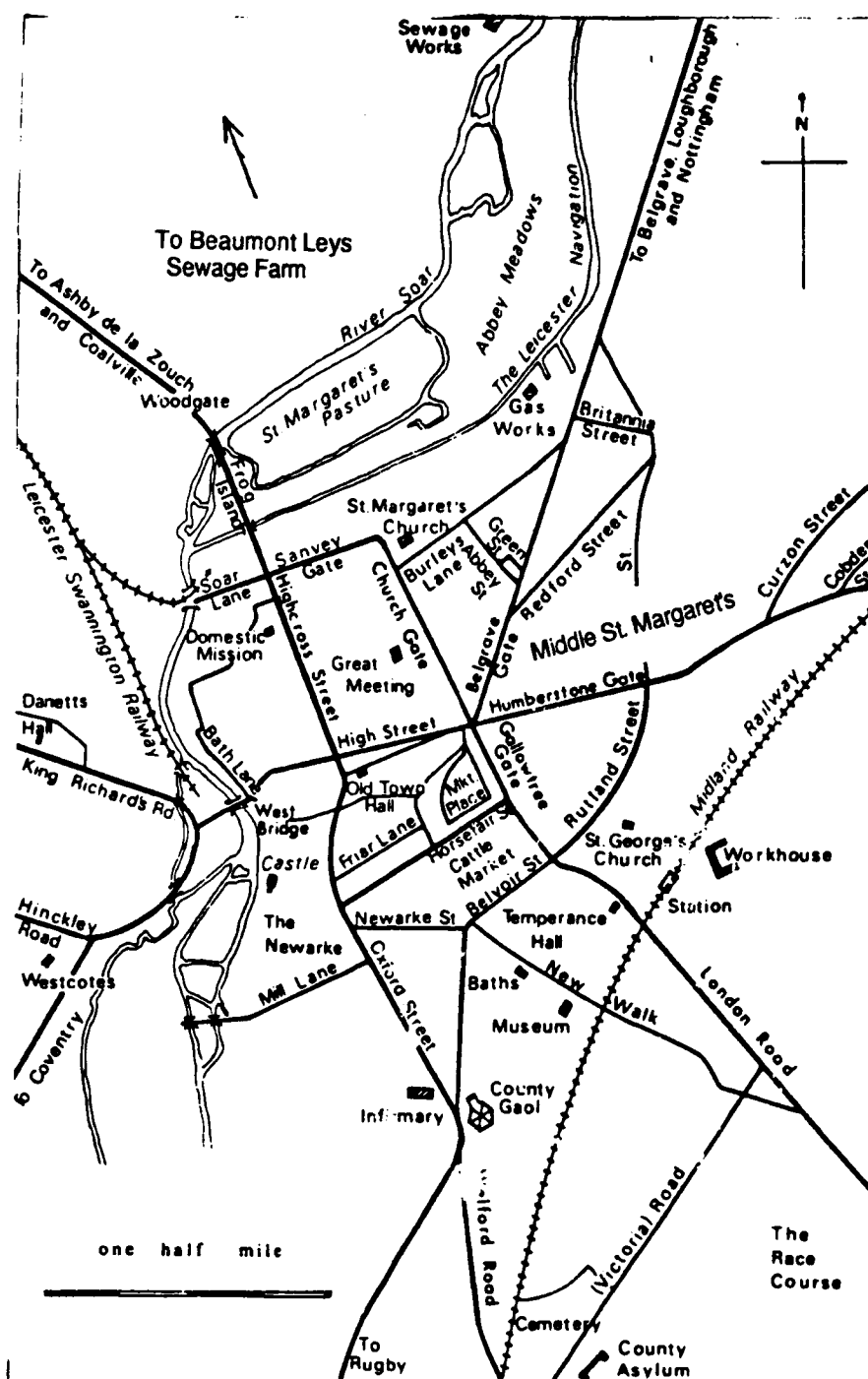


Figure 1.1 Leicester in 1860

Adapted from: Malcolm Elliott, Victorian Leicester (London: Phillimore & Co., 1979), n.p.

factories was nearly complete by 1891.¹¹ Osterud reports that women were always heavily employed in hosiery and that this tendency only increased throughout the period making hosiery into an industry with a predominantly female labor force. This trend was not duplicated in shoe-making but female labor still made up something near 33% of the total in this industry. A point that Osterud brings out that is especially relevant to the discussion of infant mortality in this study is that married women tended to be part of the workforce while their children were quite young and only exited the labor market when their children were old enough to replace the mothers' incomes. I will not argue that the working mothers materially contributed to infant mortality but the issue does resonate in the rhetoric of the problem.

Politically Leicester's local government lends itself to a periodization based on the 1835 Municipal Corporations Act. The corrupt, debt-ridden, Conservative-dominated local corporation, perpetuated by cooptation, gave way to a ratepayer-elected "reformed corporation" on 1 January 1836. The new administration was overwhelmingly Liberal (52 to 4) and largely non-Anglican (40 to 16).¹² These two features continued to characterize the town council throughout the period but there were some changes taking place within the Liberal and dissenting leadership. According to Peter Jones' study the original leaders of the reformed corporation were large manufacturers but these individuals were gradually replaced by men of lesser means and professionals.¹³ This finding is in keeping with E.P. Hennock's detailed analysis of Birmingham and Leeds in Fit and Proper Persons: Ideal and

¹¹ Nancy Grey Osterud, "Gender Divisions and the Organization of Work in the Leicester Hosiery Industry," in Unequal Opportunities: Women's Employment in England 1800-1918, ed. Angela V. John (Oxford: Basil Blackwell, 1986), 45-68. See also Sonya Rose, Limited Livelihoods: Gender and Class in Nineteenth-Century England (Berkeley: University of California Press, 1992), 4-7.

¹² A. Temple Patterson, Radical Leicester: A History of Leicester 1780-1850 (Leicester: University College, 1954), 214-15. The breakdown by denomination of the dissenters was 12 Unitarians, 12 Baptists, 10 Independents, 3 Quakers, 2 Methodists, and 1 Huntingdonian.

¹³ Peter Jones, "The Recruitment of Office Holders in Leicester 1861-1931," Transactions of the Leicestershire Archaeological and Historical Society 57 (1981-82): 64-77.

Reality in Nineteenth-Century Government.¹⁴ Not only did large manufacturers remove themselves from the town council (as opposed to the magistracies which continued to be desirable to manufacturers) but the composition of the "professional" members of the council shifted; in the early years of the reformed corporation "professionals" were represented by physicians but in later years accountants and other professionals replaced them. Despite such changes in personnel the local government was staunchly Liberal from 1849 to 1891 although electoral landslides to the extent realized in 1835 were a rarity.

The national government which produced the 1835 Municipal Corporations Act was expanding in terms of participation by an extended franchise and in terms of the central government's role in the lives of the citizens and the administration of local governments. Catholic emancipation in 1829 and especially the Reform Act of 1832 ushered in the notion of the malleability of the constitution along with a relatively small number of new voters. The reformed Parliament promulgated the Factory Acts of 1833, the New Poor Law of 1834, and of course the Municipal Corporations Act. Central government concerns in matters of public health were brought into focus by Edwin Chadwick's 1842 Report on the Sanitary Condition of the Labouring Population of Great Britain. Public awareness of deplorable urban living conditions was heightened by this well-publicized and well-distributed report and legislation followed. Piecemeal laws such as the Nuisances Removal Acts of 1846 and the Towns Improvement Clauses Act of 1847 culminated in and were consolidated to some extent by the Public Health Act of 1848. This legislation created the central government's General Board of Health. Chadwick was appointed the sole stipendiary commissioner, from which position he attempted to guide local and national public health policies with mixed success. Under the terms of the Act local governments were permitted rather than compelled to create local boards of health. Both carrot and stick

¹⁴ E.P. Hennock, Fit and Proper Persons: Ideal and Reality in Nineteenth-Century Government (London: Edward Arnold, 1973; reprint, Ann Arbor: UMI, 1991).

incentives were present in the bill. Local governments choosing to apply the Act became eligible for low-interest loans to finance such projects as municipal sewerage systems. Local governments which chose not to apply the Act could have its provisions forced upon them if their annual death-rates exceeded the level of 23 per 1,000 living persons. While that compulsory aspect of the legislation was rarely if ever used it has been suggested that some municipalities applied the Act to avoid the intervention of central government in local affairs.¹⁵ It is unclear whether the reformed corporation of Leicester was motivated by such apprehension in its decision to apply the Act. It can be said with some certainty that influential leaders of the corporation supported the passage of the Act by Parliament but hoped that it would not give such coercive powers to the central government.¹⁶

The central government passed numerous additional pieces of public health legislation between 1849 and 1891. Much of this legislation, such as the Public Health Act of 1872 or the Infectious Disease Notification Act of 1889, did not have great impact on Leicester because the borough had already set similar standards for itself. An exception to this pattern was the 1871 Compulsory Smallpox Vaccination Act which, by increasing penalties for recalcitrant parents, contributed to widespread noncompliance and anti-vaccination agitation in Leicester.

Smallpox vaccination illustrates concisely the operation of what I am calling an accepted remedy. Probably by the 1840s and certainly by the 1860s, vaccination was perceived by medical professionals, lawmakers, and the majority of laymen to be effectual as a preventive or limiting measure to combat the disease. As vaccination came to be more widely practiced the incidence of the disease actually decreased. In truth vaccination did not supply as complete immunity from smallpox as its staunchest supporters believed but it

¹⁵ Malcolm Elliott, Victorian Leicester (London: Phillimore & Co., 1979), 58.

¹⁶ Leicestershire Record Office (LRO) CM 1/5, Common Hall Books, Minutes of Town Council (Minutes), 22 March 1848, 90-92.

appeared to most interested parties that it did indeed ameliorate the problem. A method, treatment, or technology that was widely perceived to be efficacious by a relevant public health community (different communities were significant for different problems) constitutes what I will call an accepted remedy.

A distant and illegitimate cousin to Thomas Kuhn's concept of a scientific paradigm, an accepted remedy is merely a technique that has been demonstrated to ameliorate a specific public health problem to the satisfaction of an appropriate community. What this concept borrows from Kuhn is the realization that an accepted remedy, like a scientific paradigm, is a social construction that is subject to change over time. Where an accepted remedy diverges from a scientific paradigm is in the pragmatism which removes matters of public health from the realm of pure science. Kuhn himself regarded medicine and other practical applications of science as driven by "an external social need" which separates them from true sciences.¹⁷ It is in the nature of problems in public health that a palliative can be more desirable than ultimate Truth. Yet an accepted remedy in public health, despite the differences in goals and relevant communities, goes through the dynamic of social construction in a manner that is somewhat parallel to the concept of a scientific paradigm.

The relevant community for problems in public health is wider and less specialized than in matters of pure science. Oftentimes an accepted remedy would need to attract an effective political consensus in order to be implemented. Thus politicians, bureaucrats, and ratepayers can be drawn into the relevant community with or without knowledge and experience about the problem or any proposed solutions. Professionals,

¹⁷ Thomas S. Kuhn, The Structure of Scientific Revolutions (Chicago: University of Chicago Press, 1962), 19. The concepts that Kuhn explores are too complex for the space available here but I do not consider the formation of an effectual consensus to be as cataclysmic as a scientific revolution nor truly parallel to "mopping-up" in "normal" science. See also Thomas Kuhn, The Essential Tension: Selected Studies in Scientific Tradition and Change (Chicago: University of Chicago Press, 1977), 141-45.

whether in medicine, engineering, or other problem-specific fields, are always involved in the dynamic of an accepted remedy whether they aid in its formulation, merely accept its tenets, or stand in opposition to it. Where no accepted remedy exists on a specific problem it is usually the professionals who are charged with (or take upon themselves) the responsibility of determining the nature of the problem and finding ameliorative responses that may evolve into an accepted remedy. Public health problems, once they are perceived as problems, demand solutions especially when there is believed to be an element of transmissibility involved ("zymotic" in Victorian terms). Responses may take the form of trial and error with wide variations in ameliorative value. In addition a relevant community on public health problems can include other interested parties whether they are institutional, as in the press, or individual. The public aspect of public health problems induces the expression of opinions from a wide variety of sources. These opinions may contribute to, detract from, or be tangential to the development of an accepted remedy.

Given the diversity of experiences and interests within a relevant community for a public health problem it is easy to see that the development of an accepted remedy is a social construction. What may be only slightly more subtle is that the identification of an issue as a problem is socially constructed as well. Yet until an issue or condition comes to be defined as a problem of public health it does not cry out for a public solution and inspires little explicit public rhetoric. As the current study is specifically about particular issues of public health that had come to be perceived as problems by or for Leicester the emphasis here will be largely on efforts to provide solutions but there will be evidence presented about certain individuals who did not accept the classification of issues as problems or at least not as problems that were subject to amelioration by mere mortals.

A variety of sources were consulted for this study. As it is a local study many of the sources come from within Leicester but since the relevant communities as I perceive

them were partly external to Leicester, I use sources from the central government and the medical profession when they are germane to Leicester's problems of sewerage and summer diarrhoea.

Parliamentary papers are used mainly for comments on Leicester's sewerage and its relationship to the development of an accepted remedy. I have used the series published by the Irish University Press. Several documents emanating from the national General Board of Health have particular reference to Leicester's sewerage and can be found as indicated in the Leicestershire Record Office. In using the Lancet to represent professional medical opinion I am following precedents set by K.Codell Carter and Ronald D. Cassell and implicit acceptance by Smith, Wohl, and Hardy.¹⁸ Started by Thomas Wakeley in the first half of the nineteenth century as an anti-medical establishment forum for doctors, the Lancet had evolved into a respected medical journal before 1850. The journal was independent of the British Medical Association yet very sensitive to the concerns of the profession and rarely if ever complacent regarding problems of public health.

Sources from within Leicester include minutes of the town council, the Leicester Chronicle, Joseph Dare's reports as Unitarian missionary to the working classes, annual reports of the MOHs to the town council, and numerous reports commissioned by, submitted to, or otherwise intimately involved with the Local Board of Health. All of these can be found in the Leicestershire Record Office (LRO). For Joseph Dare's reports I have used Barry Haynes, Working-Class Life in Victorian Leicester: The Joseph Dare Reports (Leicester: Leicestershire Libraries and Information Service, 1991), which is also available in the LRO. The minutes of the town council are useful in some respects but give the

¹⁸ K.Codell Carter, "Nineteenth-Century Treatments for Rabies as Reported in the Lancet," Medical History 26 (1982): 67-78; Ronald D. Cassell, "Lessons in Medical Politics: Thomas Wakeley and the Irish Medical Charities, 1827-1839," Medical History 34 (1990): 412-23.

impression of being somewhat "sanitized" to obscure differences of opinion within the council. The Chronicle was not the only newspaper in Leicester throughout the period and maintained a decidedly Liberal editorial viewpoint but it was available for the entire period and Leicester was a bastion of the Liberal party between 1849 and 1891. Using this newspaper illustrates divisions within the Liberals on matters of public health that other papers would not. The annual reports of the Medical Officers of Health were presented to the town council as it acted as the Local Board of Health. The MOHs also submitted annual reports to the General Board of Health (to 1858), the Privy Council (1859-1871), and the Local Government Board (after 1871). While I cannot assume that the reports submitted to authorities of the central government were identical to those which were submitted to the local government it would appear from a comparison of their national coverage in the Lancet and the local reports in the LRO that they were at least very similar. The various reports used in this study that were produced by individuals other than the MOHs all have individual histories which need to be left to their contexts for explanation but they all bore some relationship to the Local Board of Health and presumably were preserved by some arm of the corporation.

Two recollections by Leicester officials who were close to events are also used as sources and an effort has been made to evaluate these sources critically. Both of these authors, John Storey as town clerk and Thomas Windley as chairman of the town council's Sanitary Committee, took office in the 1870s and had long tenures in their positions. In addition Robert Read, Jr.'s contemporary history (1881) is used as a source that often complements other evidence and occasionally offers a different point of view.

Numerous secondary sources specific to Leicester informed this study. Even a brief listing of these works and their merits would be unwieldy and I would advise the reader to consult specific notes of the bibliography for items of particular interest. Some of

these works are concerned with issues beyond the scope of this study and for better or worse they are used uncritically in proportion to my ignorance on those matters. Where these works cross paths with my own work I have made every effort to be faithful to the primary sources. This often results in agreement between this study and a secondary source but not always. The problems that this study addresses have been touched on previously most notably in Malcolm Elliott's Victorian Leicester¹⁹ and to a lesser extent by other authors. Elliott considered the history of Leicester's sewerage to be the story of an encroaching central government but I find the actions and inactions of the local government more intriguing since the local people were the ones who lived with and paid for the sewage systems. Elliott's brief discussion of diarrhoea, the longest before this study, recounted just the skeleton of the problem and Leicester's responses. Missing from his account were the pressure from the medical press to solve the problem and the frustration of those who attempted to solve it. To Elliott it was a problem that general "progress" solved quite capably in the early twentieth century. I believe that this history of the social construction of Leicester's problems with sewerage and summer diarrhoea provides a new and fruitful way of examining how nineteenth century British towns might react to public health problems. The "external social need" that Kuhn refers to exists whether or not an accepted remedy can be attained for a given problem. Thus there were five forms that a community's reaction to a problem may take: it might do nothing, it might attempt remedial action before there is an accepted remedy, it might try to deal with a problem that confounds the formation of an accepted remedy, it might act in compliance with an accepted remedy, or it might act in defiance of an accepted remedy. In dealing with sewerage Leicester initially acted in advance of an accepted remedy and achieved little better than a debacle. Thereafter the town acted in defiance of or denial of an accepted remedy until the

¹⁹ Malcolm Elliott, Victorian Leicester (London: Phillimore & Co., 1979).

central government forced it into compliance. With the problem of summer diarrhoea Leicester made efforts to understand and ameliorate the problem but it did so in the absence of an accepted remedy which resulted in little more than frustration for those who were involved.

2. "The experiment at Leicester failed"¹

Rapid urbanization in the era of the industrial revolution was an unprecedented phenomenon in Britain. Problems associated with such concentrations of population were largely unprecedented as well. These problems were in a great number of different areas but health problems were among the most significant. By the 1830s, if not before, it was clear that towns were far more lethal than rural areas. This situation was underscored by Edwin Chadwick's Report of 1842. As a Benthamite, Chadwick was concerned by the effects of poor urban health on productivity and the parochial poor rates. In terms of Chadwick's pythogenic theory of disease, bad smells, or miasms, were actual agents of disease. Thus the elimination of bad smells would materially lessen disease and thereby increase productivity and reduce the burden on the rates. The construction of sewerage systems to dispose of waste would clearly make towns less noisome.

Yet when Chadwick wrote his Report what would come to be called "sanitary science" was in its infancy. Sewerage systems that existed in towns were designed more as storm drains than modern sewers. Moreover, in Britain, these sewers were under the auspices of individual parishes rather than town governments. Some engineers and reformers were quite interested in making sewerage a comprehensive municipal service. Their theories of sewerage were largely untested however because of expense and parochial control. In fact the first comprehensive sewerage system in Europe, that of Hamburg in 1853, was only made feasible because a fire had destroyed much of the town. British engineers had no towns to be rebuilt to use as experiments. In these conditions no accepted remedy, no proven method of sewage removal and disposal, could have arisen. Some towns would have to serve as guinea pigs before an accepted remedy developed.

¹ Richard Smith, PP 1864, vol. xiv, Select Committee on Metropolis and Town Sewers, Minutes of Evidence, 64.

The reformed corporation of Leicester, more specifically its Highway and Sewerage Committee, was very quick to respond to the Public Health Act of 1848. The town council was among the first British towns to apply the Act to its jurisdiction, transforming itself into a Local Board of Health. Moreover the town was the first in England to appoint a Medical Officer of Health (MOH) under the terms of the Act, in the person of the surgeon, John Buck.² Additionally the Committee set itself upon the task of petitioning the General Board of Health for a sanitary inspection of the town.³ This initiative was launched by the Unitarian Liberal leaders of the town council, Joseph Whetstone and John Biggs.

Surprisingly, given their superficial similarities of religion, economic position, and political party, the call for a sanitary inspection was one of the few times that these two leaders would agree on a course of action. Whetstone and Biggs were both members of the Unitarian Great Meeting. Whetstone was one of the founders of the Meeting's Domestic Mission and Biggs was a substantial contributor to the cause. Both men were significant manufacturers, Whetstone in worsted and Biggs in hosiery. Both were Liberals. Both men advocated causes for which England's leadership was not ready. Whetstone petitioned Parliament for a national poor rate⁴ and Biggs agitated for something close to universal male suffrage.⁵ Both men recognized that Leicester had managed to clear off the inherited debt from the pre-1835 corporation before 1849, but they had distinctly different opinions on how the newly unencumbered revenue should be spent. Biggs was an "improver" or Radical Liberal while Whetstone was an "economist" or Whiggish Liberal.

² Leicester appointed two MOHs, Buck being one of them, following the 1846 Nuisances Removal Act but three months after these appointments Liverpool obtained a local act which "caught the imagination of the nation." Anthony S. Wohl, *Endangered Lives: Public Health in Victorian Britain* (Cambridge, Mass.: Harvard University Press, 1983), 180. The Liverpool model was the basis for the MOH in the 1848 act and Leicester was then the first town to conform to this model.

³ LRO CM 1/5, Minutes, 29 November 1848, 182-83.

⁴ *Ibid.*, 1 March 1848, 77.

⁵ Bill Lancaster, *Radicalism, Cooperation and Socialism: Leicester Working-Class Politics 1860-1906* (Leicester: Leicester University Press, 1987), 76.

Biggs was a popular champion because of his nearly Chartist ideals and his unilateral abolition of frame rents for his workers. Indeed the following generation commemorated him as such with an impressive statue, at an important crossroads in Leicester's City Centre. But when the future MP, Biggs, considered physical "improvements" for the town his thought turned to projects like a new building for the town council.⁶

Paradoxically, sewerage became recognized as a problem to be addressed when Whetstone, the "economist," insisted that a sewerage scheme must come before any cosmetic improvements in Leicester. It has been posited that local politicians who embraced the "sanitary idea" did so to diffuse concern over egalitarian political issues.⁷ Whetstone did not fit into this category. Whatever his thoughts might have been about enlarging the electorate, and these are unknown to me, he was such a singly stalwart supporter of sanitation and sewerage reform that there can be little doubt about his sincerity. In fact, I would argue that Whetstone was too zealous for his time; because of his personal ability and tenacity Leicester would be saddled with a sewerage system that was both inefficient and ultimately dangerous. It seems that Whetstone was moved by Chadwick's 1842 Report and concerned about Leicester's overall death rate of 30 per 1,000 which was third highest in the nation. He would also have had contact with Chadwick in the mid-1840s when the reformer took personal interest in the drainage and watering of Leicester.⁸ Whetstone wedded his personal concerns about public health with the borough's newfound solvency and the opportunity provided by the Public Health Act of 1848 to demand the primacy of sewerage reform from his position as chairman of the Finance Committee of the

⁶ The Guildhall which served as the town council meeting place and as a library among other functions had been in existence since at least the fourteenth century.

⁷ R.A. McKinley and C.T. Smith, "Social and Administrative History," in The Victoria History of the Counties of England, A History of the County of Leicestershire, vol. 4, Leicester, ed. R.A. McKinley (London: Oxford University Press, 1958), 214. [hereafter VCH 4]

⁸ Anthony Brundage, England's "Prussian Minister": Edwin Chadwick and the Politics of Government Growth (University Park, Pa.: Penn State University Press, 1988), 104-06.

town council. Yet this is far from a condemnation of the man; if the Leicester sewerage system eventually proved to be disastrous it was because later leaders, with "weaker shoulders"⁹ than Joseph Whetstone, failed to react with the decisiveness and forcefulness that he would have shown.

The sanitary inspection that Whetstone and Biggs requested, by William Ranger of the national General Board of Health in 1849, was quite positively received in Leicester.¹⁰ This report pointed to deficiencies especially in regard to the drainage of the town, but it did not prescribe any "particulars" to ameliorate the situation.¹¹ Therefore Whetstone, the newly appointed chairman of the Highway and Sewerage Committee, and Samuel Stone, the town clerk, took it upon themselves to commission an engineer to design a system for Leicester's sewage.¹² As comprehensive sewerage systems were neither legal nor plausible before the late 1840s (as they were parish not corporation systems), Leicester became something of a test case.¹³

The decision-making process within the Highway and Sewerage Committee is rather opaque, but the committee quickly affirmed Whetstone's choice of the gentleman to evaluate the town and propose a scheme. Samuel Stone referred to Thomas Wicksteed as "an eminent engineer"¹⁴ and there is every reason to believe that Wicksteed had earned such a reputation. Chief engineer of the East London Water Works, Wicksteed pioneered the use of steam engines to lift sewage, consulted on projects as distant as Boston and

⁹ Councillor William Winterton addressing the town council as reported in the LC, 4 April 1874. Despite Winterton's appeal the council shelved consideration of sewerage reform at that time.

¹⁰ Accounts of the Ranger Report can be found in McKinley, VCH 4, 264 or Malcolm Elliott, Victorian Leicester (London: Phillimore & Co., 1979), 56-57.

¹¹ LRO CM 1/5, Minutes, 27 July 1849, 289.

¹² Samuel Stone was commemorated equally with Whetstone in the "shoulders" speech by Winterton.

¹³ McKinley, VCH 4, 256.

¹⁴ LRO CM 1/5, Minutes, 5 September 1849, 313.

Berlin, and received an engineering Gold Medal for his efforts.¹⁵ In addition Wicksteed was the holder of five separate sewage treatment patents out of only twelve such patents awarded in Britain by 1850. The local press also believed that Wicksteed possessed "the most eminent engineering advice to be had."¹⁶ Table 2.1 helps to illustrate the paucity of choices available to the town in 1849, and again points to the reasonableness of the Committee's offer to Wicksteed. Few engineers of the time could boast of Wicksteed's experience in matters of sewerage.

On 17 September 1849, Wicksteed accepted the offer to survey Leicester and design a sewerage plan. He informed the town council that he could not spare the time to personally superintend the construction of the system. The council, acting as the Local Board of Health, hired him at five guineas per day on 19 September.¹⁷ The drainage conditions which confronted Wicksteed were dismal. What rudimentary sewers existed in the town had been installed by individual parishes or private developers with little coordination. These sewers were flushed only by rainwater, had only a slight gravitational flow, and were square and angular; they tended merely to accumulate filth. What effluent managed to escape the various systems was simply discharged untreated into the River Soar.¹⁸ Approximately 3,000 uncovered cesspools littered the urban landscape, occupying fully 1 1/4 acre of the town.¹⁹ The cesspools were concentrated in the poorer neighborhoods where overcrowding was heaviest. The deleterious effects to health from stagnant, raw sewage will be treated elsewhere in this paper, but it is relevant here to mention the coincidence of such sewage with housing patterns. In 1850 the Highway and

¹⁵ The Engineer 32 (1 December 1871): 383; Proceedings of the Institution of Mechanical Engineers (1872): 23.

¹⁶ LC, 4 September 1852.

¹⁷ LRO CM 1/5, Minutes, 19 September 1849, 333-34.

¹⁸ Jack Simmons, Leicester: Past and Present, vol. 2, Modern City 1860-1974 (London: Eyre Methuen, 1974), 13.

¹⁹ Wohl, Endangered Lives, 95.

Table 2.1
Sewage Treatment Patents Awarded in Britain 1800-1875

Years	Patents
1800-1809	1
1810-1819	0
1820-1829	0
1830-1839	1
1840-1849	10
1850-1859	59
1860-1869	75
1870-1875	156

Sources: PP 1857 vol. xx, Report on the Means of Deodorizing and Utilizing the Sewage of Towns by Henry Austin, C.E., 93-96. PP 1876 vol. xxxvii, Report of a Committee appointed by the President of the Local Government Board to Inquire into the Several Modes of Treating Town Sewage, Appendix vi, 105-115.

Sewerage Committee attempted to respond to complaints by middle class landlords and working class tenants about the high cost of having cesspools cleaned by initiating a municipal program to empty their contents at five shillings per week.²⁰ The committee soon halved the rate because the tenants, who were held responsible for the fee, did not subscribe to the service in numbers acceptable to the landlords.

It was clear to many members of the community regardless of economic status, that the status quo for drainage and waste removal was unsatisfactory. Wicksteed's

²⁰ LRO CM 1/5, Minutes, 20 December 1849, 395-96.

comprehensive sewerage scheme was submitted to the Local Board in March of 1850. Writing on behalf of the Highway and Sewerage Committee, Samuel Stone called the plan "a very long, able, and interesting document [it] contains much information and suggestions of a very valuable character which will require the calm and deliberate consideration of the Council."²¹ Stone's words were taken to heart; five hundred copies of the report were printed and distributed for "calm and deliberate consideration." Additionally, the Leicester Chronicle ran a full description spread across two issues of what would come to be described as the "Preliminary Report."²²

The essence of the Wicksteed system was to drain the town's sewage in brick lines, which were more porous but less expensive than glazed earthenware pipes, by gravitation to the "works" which were to be located on the banks of the Soar, north of the town and downstream from Leicester (see figure 1.1). There the sewage would be pumped into long reservoirs where it would be treated with a lime slurry to precipitate the solid matter. The liquid portion would move slowly through two reservoirs totalling 190 feet at which point it would be deemed "sweet" and be discharged into the river. The precipitated solid matter would be raised by an Archimedes screw to a "Jacob's ladder" series of large buckets that would raise the material to a height of twenty feet. Then it would be deposited into a large pipe with perforated trays; gravitational force would press out any remaining liquid. The trays would then be removed, the residue cut into brick size, and dried to be sold as manure.²³

Several key assumptions which would have both short and long-run effects informed the Wicksteed plan. The first of these assumptions was that the collection of

²¹ Ibid., 20 March 1850, 451.

²² LC, 23 March 1850, 30 March 1850.

²³ The most concise description of the Wicksteed system can be found in PP 1857, vol. xx, Royal Commission on the Deodorization and Utilization of the Sewage of Towns, 22-24. [hereafter PP 1857, vol. xx, RCDUST].

sewage, or human excreta, could be a profit-making venture. While "sewage for profit" sounds quite odd to late twentieth century ears, it was a pervasive goal for Victorian reformers.²⁴ They were deeply convinced that farmers would buy town sewage for fertilizer. Edwin Chadwick himself founded a private company to distribute human waste to agricultural consumers.²⁵ It was obvious to the Chronicle that "Mr. Wicksteed places great reliance upon the returns to be derived from the sale of the manure."²⁶ In fact Wicksteed anticipated that the manure bricks would fetch £2 per ton, a price on a par with high quality South American guano. However Leicester did not enter into the venture to make profit for itself. The corporation intended to bear the expense of installing the lines and erecting the "works" as a civic function. Wicksteed's Patent Solid Sewage Manure Company would receive the town's sewage in exchange for the operation of the "works." Thus any profit that would accrue from the sewage would belong to the Company. This does not mean that the corporation rejected "sewage for profit" as too risky a venture; in the lease that was granted to the Company, the Company was permitted to back out of the contract at any time.²⁷

Another faulty assumption underlying the Wicksteed system was an underestimate of Leicester's future growth. Wicksteed estimated that his system would be sufficient for thirty years, but it is unclear how he arrived at that figure. If Wicksteed relied on what I would call "best estimates" a population growth of 19% per decade might have been projected.²⁸ The actual population growth rate over the thirty year period (1851-1881) was

²⁴ See for example S.E. Finer, The Life and Times of Sir Edwin Chadwick (London: Methuen & Co., 1952), 300.

²⁵ Brundage, England's "Prussian Minister," 101-07.

²⁶ LC, 16 March 1850.

²⁷ LRO L.614, John Moore, MOH 1855, 7.

²⁸ These figures can be constructed from the data presented in Barry Haynes, Working-Class Life in Victorian Leicester: The Joseph Dare Reports (Leicester: Leicestershire Libraries and Information Service, 1991), 10, 96, based on growth 1831-41 and 1841-51.

34% per decade.²⁹ Again the Highway and Sewerage Committee accepted Wicksteed's figures, and therefore the town council, or Local Board of Health, did as well. Thus the corporation expected a thirty year respite from sewage problems if the system was implemented.

A third assumption, that rainwater would be sufficient to flush the proposed system, will be dealt with in specific detail later. Here it must be argued that there was no serious alternative. Flushing the sewers with municipal water may seem eminently practical in the late twentieth century but it was hardly practicable in 1850s Leicester. Municipal corporations were legally prohibited from establishing their own waterworks systems if private companies stood willing to provide such services. Such a company had existed in Leicester since 1846.³⁰ Although the corporation held a minority position in that company (originally 21%) it was unable to set policy for the company.³¹ One policy of the company was that customers could not subscribe to the service merely to flush water closets. So even where dwellings communicated with the sewerage system via water closets no benefits could be derived if the occupants used another water source for other household uses. This situation made it hardly imaginable that anything other than rain could have flushed Wicksteed's system; the seemingly complementary services of water and sewerage were not in communication conceptually even when such communication was physically possible.

A fourth assumption of the Wicksteed scheme, based on limited evidence, was that a lime slurry could effectively purify the sewage. From Table 2.1 it is clear that there were

²⁹ Ibid., 96. This average distracts from the increasing population growth. If Wicksteed anticipated 57% over 30 years this was in fact realized in 20 years.

³⁰ Simmons, *Leicester: Past and Present*, 11.

³¹ Robert Read, Jr., *Modern Leicester: Jottings of Personal Experience and Research, with An Original History of Corporation Undertakings, and of each Regular, Militia, Yeomanry, & Rifle regiment localised at The New Military Centre* (Leicester: Winks & Son, 1881), 28-29.

not a great many sewage treatment systems to choose from. The lime slurry method of purification had not been attempted on as large a scale as a town the size of Leicester but several experiments had produced results which permitted optimism. Two chemistry professors from Guy's Hospital, Alfred S. Taylor and Arthur Aikin, tested the lime slurry method under laboratory conditions and found the resulting water to be quite pure.³² A field test undertaken in Leicester satisfied the Local Board of Health and positively delighted the Leicester Chronicle.³³ That these tests formed the basis of the town's acceptance of the treatment method tells us two important things. First the lime slurry method of sewage treatment had achieved nothing approaching the status of an ameliorative technical consensus. It was still an experimental method that required demonstration of its likely success. Second the leaders of Leicester were rational responsible consumers of Wicksteed's approach. They personally attended the on site experiment and evaluated the merits of the method.

Under the terms of the 1848 Public Health Act it was not sufficient for the Local Board and/or the corporation to accept a sewerage scheme. Parliament would then need to pass a local bill and the General Board of Health must approve the borrowing of the necessary funds. While Parliament proved not to be a major obstacle to the plan, the General Board assumed a confrontational position.

It has been argued that the General Board's antagonism to the Wicksteed scheme was the result of personal animosities. Historian S.E. Finer concluded that Edwin Chadwick of the General Board resented the arrogance of engineers in general, and of

³² LRO Pamphlets vol. 49, Report of the Highway & Sewerage Committee of the Local Board of Health for the Borough of Leicester, Respecting the Proposed Scheme for the Sewerage of Leicester, and the Report of the General Board of Health Thereon, with 1. A Report from Mr. Lee, One of the Superintending Inspectors of the General Board of Health; 2. A letter from the General Board to the Local Board; and 3. The Reply of Mr. Wicksteed to the Report of Mr. Lee [1852], 41-51. [hereafter LRO Pamphlets vol. 49, Report...Respecting...Scheme]. The two chemists declined to evaluate the quality of the manure for fertilizer.

³³ LC, 2 October 1852.

Wicksteed and Robert Stephenson in particular.³⁴ That contention is shared by all of the contemporary sources from Leicester. But in the long run, the Local Board and the General Board both presented valid points and mistaken conclusions.

The General Board of Health did not respond to the Wicksteed proposal in a timely manner. The Local Board submitted Wicksteed's "Preliminary Report" to the General Board at the same time that it initiated the legislative process for the local act of Parliament. At this time the General Board had no comment. Several months later the Local Board forwarded Wicksteed's "Written Report" to the General Board. The "Written Report" revised and refined the "Preliminary Report." The "Preliminary Report" was drawn while Wicksteed was a five guinea per day consultant, but the "Written Report" was drawn when Wicksteed had signed on to oversee construction and operate the works.

The General Board "sat" on Leicester's plan until the day before the local bill went before Parliament. According to Leicester's town clerk, Samuel Stone, Chadwick and his board were accused of being dilatory, underhanded, and unreasonable.³⁵ Indeed the timing of Chadwick's objection to the plan is questionable. The substance of the objection was that the plan did not specifically diagram how each dwelling in the town would communicate with the new sewers. Since Leicester's program was precocious, the protocol for interaction between Local Boards and the General Board was being invented as they went along. The Local Board was not working closely with the General Board so the demand for such specificity, however desirable, came as a last minute surprise. Parliament granted the local act, but the General Board retained the right of final approval of the plans before the money could be borrowed.

³⁴ Finer, The Life and Times of Sir Edwin Chadwick, 455-56.

³⁵ LRO Pamphlets vol. 49, Samuel Stone, Report...Respecting...Scheme, iii-x.

Chadwick commissioned a senior inspector of the General Board, William Lee, to evaluate the Leicester plans before they could receive General Board approval. Lee reviewed the plans and toured Leicester in late 1851. On 26 January 1852, Lee made his report to the General Board of Health.³⁶ Lee had nothing positive to write about the proposed Wicksteed system; his numerous objections can be grouped into four general complaints.

The first of Lee's complaints was that Wicksteed's scheme was incomplete. In part this echoed Chadwick's demand that every building or court should be shown to communicate with the municipal sewerage system. Lee contended that without a house-to-house survey of Leicester no plan could predict either efficiency or economy. Moreover Wicksteed's "Preliminary Report" described a system that would be implemented incrementally as subscription funds became available. Ultimately the system was funded by loans against the rates but the ambiguity in the "Preliminary Report" allowed for a measure of local autonomy that could have been perceived as a challenge to the General Board's control over future sewerage systems.

Second, Lee pointed to problems that the system could have with rainwater. Lee contended that the sewers' capacity was inadequate for sewage alone and that rain could inundate and incapacitate the system. The inspector believed that Wicksteed had erred in his calculation of the ability of the system to dispose of rainwater because the engineer based his figures on average rainfalls rather than the greatest deluges on record. In Lee's opinion, a large storm would "impound" the sewage and prevent it from reaching the works.

³⁶ LRO Pamphlets vol. 49, William Lee, Report...Respecting...Scheme, 23-24. I have grouped Lee's points into four topics and will treat each individually but the source remains the same until otherwise noted.

Third, Lee did not like the plan for the treatment works. He objected to the size of the sewage reservoirs, claiming that their evaporation would be "contaminating the air." Lee was not really out of step from educated opinion with this pythogenic statement; indeed it is surprising how often pythogenic, or miasmatic, explanations accurately describe the conditions leading to disease, if not the actual mechanisms or vectors upon which transmission depends. Lee also doubted the efficacy of using lime as a purifier, but he was unfamiliar with the lime slurry method and had not troubled to acquaint himself with Taylor and Aikin's research.

Fourth, and a bit ironically, Lee objected to the expense of the Wicksteed system. As mentioned above, Wicksteed had opted for brick sewer lines. Glazed earthenware pipes were much less porous than brick but they were much more expensive. Wicksteed attempted to compromise between the two methods by proposing two overlapping layers of brick to minimize the amount of porous material exposed to the sewage. Lee thought that the second layer of bricks was an unnecessary expense. Moreover Lee thought that the sewer lines ran unnecessarily deep in the earth under the streets. If the proposed lines were generally raised three feet, Lee foresaw great savings. Two months after his initial report, Lee added that Wicksteed had acted irresponsibly by leaving so much room for municipal growth in his scheme. Lee wrote that Wicksteed had allowed for a fourfold increase in Leicester's population. This was an unreasonable expenditure to Lee; it was "extravagant and full of injustice to the existing ratepayers."³⁷ How Lee arrived at this population projection is no more clear than how Wicksteed arrived at his, but from the 1851 census figures, Lee thought that the system could accommodate up to 240,000

³⁷ LRO Pamphlets vol. 49, William Lee, Report to the General Board of Health on a Scheme for the Drainage of Leicester, and the Conversion of the Sewerage Water thereof into Manure; also Remarks on Mr. Wicksteed's Reply to the above-named Report (1852), 33. [hereafter LRO Pamphlets vol. 49, Report...also Remarks].

persons. As will be seen below, the system proved dangerous with less than half of that population level.

Lee urged the General Board to reject the proposed Wicksteed system in its entirety. His report was the first volley in a series of battles between Chadwick's General Board and Whetstone's Local Board. The General Board was victorious in this first skirmish. Writing for the General Board on 13 February 1852, Henry Austin informed Leicester that "[t]he General Board deeply regret the inconvenience to which the Local Board will have been put by the preparation of so imperfect, so wasteful, and so unsatisfactory a scheme; and by the necessity which the general board consequently feel for declining to sanction a mortgage for its execution."³⁸ Austin also took this opportunity to accuse the Local Board of being responsible for the delays in the General Board's actions.³⁹

Immediately after Austin's pronouncement on the Leicester scheme, Wicksteed defended his plan before the Local Board. His correspondence to the Local Board is largely a point by point rebuttal of Lee's objections, but he prefaced all specific remarks by disclaiming, "I have abstained from personalities, which are as undignified as they are unnecessary in making a plain statement of facts, or in arguing upon a scientific subject."⁴⁰ Without rehearsing Wicksteed's technical disagreements with Lee, two points are worthy of mention: one notable, the other notorious. The first of these is that Lee reviewed the "Preliminary Report" (also called the "Printed Report"), in addition to the "Written Report," and criticized their inconsistencies. Wicksteed contended that the "Preliminary Report" was relatively superficial and only the "Written Report" should have been reviewed. The "Written Report" differed from the "Preliminary Report" not only because it was more

³⁸ LRO Pamphlets vol. 49, Henry Austin, Report...Respecting...Scheme, 26.

³⁹ *Ibid.*, 25.

⁴⁰ LRO Pamphlets vol. 49, Thomas Wicksteed, Report...Respecting...Scheme, 28. The following information comes from this source also.

detailed, but because the projected reservoirs at the works had been vastly reduced in surface area. This is notable because it demonstrates that Wicksteed's technology, informed as it was by pythogenic theory, changed over a relatively short period of time; there was no tried and true method of sewage treatment in the early 1850s. The notorious aspect of Wicksteed's rebuttal concerned the ability of the proposed system to handle the combination of sewage and rainwater. Wicksteed claimed that Lee's concerns about a great deluge would require sewer lines up to 26 feet in diameter to sufficiently drain the town. More to the point, Wicksteed expressed his belief that rainwater would "dilute" the sewage and make it less offensive. Dilution might appear to have salubrious effects within a pythogenic framework because it would weaken the smell. Of course dilution would have no helpful effects on the real agents of disease, and any volume incapacities of the system would serve to spread these agents to the extent that the system backed up.

Wicksteed's defense of his proposed system meant nothing to the General Board; it was addressed only to the Local Board. But the Local Board was not cowed by the General Board. Having already secured Parliament's approval for a scheme in 1851, Whetstone was not about to let Lee, Austin, and Chadwick prevent Leicester from borrowing the necessary funds to get the system working. In the spring of 1852 Joseph Whetstone proved to be a masterful politician, marshalling his Local Board and outwitting the consummate bureaucrat, Edwin Chadwick.

In late March, Whetstone approached the Local Board with four potential responses to Austin's rejection of the scheme. First, they could meet with the General Board to see if their differences could be overcome. Second, the Local Board could petition Parliament to obtain the records of the General Board. The purpose of this was said to be a suspicion that the General Board would approve only plans that were drawn up by their staff engineers. Third, the Local Board could submit Wicksteed's plans and the General Board

could submit Lee's objections to a mutually agreeable, impartial engineer for arbitration. Fourth, the Local Board could do nothing and hope for a change in personnel or philosophy within the General Board.⁴¹ Scrapping the Wicksteed plan was not offered as a potential response.

By his initiative, Whetstone kept the Local Board's debate within the parameters of his proposed responses. Three of the four options were debated and supported by some members of the town council. Opinions were floated about the high quality of Lee's report (Parker), the vindictiveness of Lee's report (Moxon), and Lee's apparent hypocrisy, seeming to approve the scheme while he was in Leicester but denouncing it when he returned to Chadwick's London (Crawford). Whetstone's third response, independent arbitration, escaped debate, so the Alderman once again took the floor. Whetstone then presented his strategy. The Local Board should humbly ask the General Board for the audience mentioned in the first option. While there, the Local Board's deputation would suggest putting the plan to an independent engineer. Whetstone told the Local Board that its deputation should nominate the renowned railway engineer, Robert Stephenson. Chadwick would find the name of Stephenson rather distasteful,⁴² but if the proposed referral would appear spontaneous it would be difficult for Chadwick to oppose such a celebrated name. Whetstone moved this plan and it was quickly adopted.

In May, 1852, the Leicester deputation was met in London by Chadwick, Dr. Thomas Southwood Smith, and the chair, MP Lord John Manners. Leicester's deputation consisted of members of the Highway and Sewerage Committee led by Joseph Whetstone and Samuel Stone. According to Stone, the Leicester deputation complained about the General Board's delays and Lee's report. In Stone's account of the meeting, with its local

⁴¹ LC, 27 March 1852.

⁴² Finer, *Life and Times*, 380, 445. Finer points to disagreements and animosity between Chadwick and the engineering profession generally as well as between Chadwick and Stephenson specifically.

viewpoint, Whetstone then put forward his suggestion of an impartial engineer; either Stephenson or Rendel would be acceptable. Lord Manners considered this idea to be "not at all unreasonable." Stone records no objections from Chadwick or Southwood Smith, in fact they appear silent, and the Chair's opinion held sway. The Leicester deputation departed the meeting and went directly to meet with Stephenson.⁴³ Whetstone's strategy succeeded with ease.

On 26 May, Stephenson expressed his approval of the Wicksteed scheme; this was something of a foregone conclusion since he was Whetstone's hand-picked arbiter. Despite Stephenson's endorsement of the scheme, the engineer editorialized about the conduct of both sides: General and Local Boards were both at fault. As an MP, Stephenson acknowledged the "transparently bitter feeling"⁴⁴ between the two boards. With pomposity befitting an MP, Stephenson went on to write that "it pains me more to trace a thread of acrimony running through the negotiation, uncalled for, I think, on the part of the Local Board of Health, although with provocation; and... altogether undignified and unworthy on the part of a General Board especially appointed to encourage and forward, and not to thwart and delay, or, as has sometimes happened within my own knowledge, altogether to stop improvements of a sanitary character."⁴⁵ Stephenson's approval was essentially a go-ahead for the Wicksteed system; it was expected that he would oppose Chadwick, but he did place some of the onus on the Local Board. His distribution of guilt was not echoed in Leicester.

⁴³ LRO Pamphlets vol. 49, Report of the Highway and Sewerage Committee of the Local Board of Health for the Borough of Leicester, with 1.-A Report from Robert Stephenson, Esq. Civil Engineer. 2.-Remarks on the Chemical Portion of Mr. Lee's Report, by Mr. Aikin and Dr. Taylor (1852), 3-4. [hereafter LRO Pamphlets vol. 49, 1 Report...2 Remarks].

⁴⁴ Ibid., 7.

⁴⁵ Ibid., 12.

Throughout 1852 writers in Leicester defended the Local Board and attacked the General Board. Regarding the problems between Wicksteed and Chadwick, Stone wrote, "[a]t the time of [Wicksteed's] appointment, it was not known, or even suspected, that any personal feeling of hostility existed towards him on the part of any influential member of the General Board."⁴⁶ The Chronicle was clear about whom it supported: "In vain does the Town Council persevere, with a laudable wish to promote the public health, in promoting a well-matured, carefully considered scheme, -there is a power which stands above it in the metropolis which throws obstacles in its way, with a pertinacity that would do honour to a better cause."⁴⁷ The Unitarian missionary Joseph Dare went so far as to blame the General Board for working class people patronizing a folk-healer, the "Wise Woman of Wing," for their ailments: "The London Board, by its dilatoriness and needless objections to the proposed Drainage Scheme, has been the best patron she has had in this neighborhood; for many here who visit her have no positive disease, but are oppressed with that languid disenjoyment of existence consequent upon malaria and undrained dwellings."⁴⁸ There are numerous examples of poor opinions of the General Board emanating from Leicester.

As the General Board had agreed to abide by Stephenson's decision, construction began on the system in 1852. It was 1855 before the Wicksteed system was fully functional in Leicester. For much of the town the event was eagerly anticipated, but MOH John Moore was displeased that many water closets would not prove to be a link between a piped water supply and piped sewers. As mentioned above, the water company sold only an "all or nothing" package, showing no particular interest in public health for its own

⁴⁶ LRO Pamphlets vol. 49, Samuel Stone, Report...Respecting...Scheme, iv.

⁴⁷ LC, 4 September 1852.

⁴⁸ Joseph Dare (1852), quoted in Haynes, Working-Class Life, 44. Dare used the word 'malaria, in its original pythogenic sense of 'bad air.'

sake.⁴⁹ The Local Board could do little to influence the water company, its independence was perfectly legal.⁵⁰ Cesspools and middens remained but were reduced in the town, and dry conservancy, from regularly emptied pail closets, would emerge as a means of waste disposal.

In 1857, one year before the General Board's demise, the Wicksteed system in Leicester was presented in Parliament as a possible national model.⁵¹ During the hearings it was conservatively estimated that more than £30,000 had been "necessary to bring the process to its present practical condition."⁵² It was also claimed that Wicksteed could provide a similar system to a town of 500,000 people for £40,000.⁵³ In 1857, only three other towns in Britain had sewerage systems sufficiently comprehensive for the Royal Commission to consider as models. In terms of profitability none of them had results that were compelling enough to form a technological consensus on sewage treatment.

Parliament's search for an accepted remedy on sewerage continued into the 1860s. Many towns still had no system in the early 1860s and the Wicksteed system continued to be evaluated. Testifying before the Select Committee on the Sewage of Towns on 12 May 1862, engineer and farmer Edwin O. Tregelles observed that "chemically, the experiment at Leicester is a success; it has cleansed the town, and it has materially lessened the mortality in the town; but as a matter of pounds, shillings and pence, it is a loss; they are

⁴⁹ LRO L.614, John Moore, MOH 1854, 6.

⁵⁰ It would be another story to trace the water supply but as mentioned above, Whetstone did manage to get the corporation involved in the endeavor. It was not a completely municipal system until the mid-1870s under Alderman Windley.

⁵¹ PP 1857 vol. xx, RCDUST, 354-55.

⁵² *Ibid.*, 24. Estimates of the cost of the Wicksteed system range from £30,000 to £60,000. I use the lowest figure because there can be no doubt that at least £30,000 was spent. Interestingly £30,000 was equal to all corporation expenditures for 1846, before the corporation applied the Public Health Act of 1848 to itself. See also Simmons, Past and Present, 13; PP 1864 vol. xiv, Select Committee on Metropolis and Town Sewers, Minutes of Evidence, 213. [hereafter PP 1864 vol. xiv, SCMTS].

⁵³ PP 1857 vol. xx, RCDUST, 24.

disappointed there."⁵⁴ Indeed Wicksteed's company was greatly disappointed. The concept of "sewage for profit" was taking quite a beating in Leicester. Original calculations valued the manure bricks at £2 per ton, but by this time the bricks were selling at 2 shillings per ton.⁵⁵ Wicksteed's company was realizing only 5% of ideal revenue per unit. So the system that the company expected to realize £10,000 per annum in its first fifteen years (and double that figure per annum in the second fifteen years), was quickly operating at a loss.⁵⁶ Moreover there was no repeat business; "they sold it to fresh customers every time; that is to say, a man used it, and then would not buy anymore."⁵⁷ Tom Taylor, secretary to the Local Government Board, testified on 16 June, 1864 that "the dry manure which was produced at Leicester was next to useless."⁵⁸ Taylor was also asked if there was an exemplary sewage treatment process that the central government should apply to provincial towns as a sort of template. He replied there was not.⁵⁹

In the 1860s the financial problems of the Wicksteed system continued to mount while hints of its chemical failure began to be heard. First, Wicksteed's private company "bugged out" of the project by turning it over to the corporation in 1865. The corporation inherited the company's buildings and machinery at no cost, but it also inherited a £2,000 annual expense to keep the system functional.⁶⁰ This £2,000 was equal to 15% of the corporation's entire annual expenditures in the period before the Public Health Act of 1848 had been applied. Second, non-pecuniary deficiencies of the system began to be noticed in

⁵⁴ PP 1862 vol. xiv, First Report from the Select Committee on the Sewage of Towns, 29. [hereafter PP 1862 vol. xiv, FRSCST].

⁵⁵ PP 1864 vol. xiv, SCMTS, 213. The price would eventually fall to 1s per ton. Read, Modern Leicester, 19.

⁵⁶ Read, Modern Leicester, 19.

⁵⁷ PP 1864 vol. xiv, SCMTS, 213.

⁵⁸ *Ibid.*, 169.

⁵⁹ *Ibid.*, 170.

⁶⁰ John Storey, Historical Sketch of some of the Principal Works and Undertakings of the Borough of Leicester since the Passing of the Municipal Corporations Reform Act (Leicester: W.H. Lead, 1895), 14-15.

Leicester. R.A. McKinley notes that by 1867 there were comments that the River Soar had smelled bad for several years.⁶¹ These two developments did not bode well for Leicester's sewerage system. Moreover the man whose leadership on public health issues had been so critical to this point, Joseph Whetstone, died in the winter of 1868. Whetstone had been committed to "economy" as well as sanitation and his death occurred at the unfortunate time that the Wicksteed system was open to criticism on both counts.

As problems in Leicester's system were becoming more pronounced some other British towns were experiencing apparent success by a method of disposal known as sewage irrigation. By this method a town's sewage was drained or pumped to rural areas where it would be allowed to percolate into the soil. On this soil which was perceived to be nutrient-enhanced crops such as rye or hay were cultivated for sale. This method would come to serve as the basis for an accepted remedy on Victorian sewage disposal. The use of raw town sewage for agricultural irrigation was perceived to bring two benefits. First, it would ameliorate the problem of river pollution that came from imperfectly treated sewage.⁶² Second, it revived the notion of "sewage for profit."⁶³

River pollution, or rather lawsuits arising from river pollution, provided the impetus for many towns to initiate sewer systems. Christopher Hamlin has shown that it was a norm for towns to resist such projects until they were forced to act by court injunctions.⁶⁴ Indeed it was such a commonplace that Lord Robert Montagu of the Select Committee on Metropolitan and Town Sewers was surprised to learn that Leicester had not installed the Wicksteed system in response to such an injunction.⁶⁵ While Hamlin's thesis

⁶¹ McKinley, *VCH* 4, 278.

⁶² *LC*, 20 January 1872.

⁶³ *Ibid.*, 9 July 1870.

⁶⁴ Christopher Hamlin, "Muddling in Bumbledom: On the Enormity of Large Sanitary Improvements in Four British Towns, 1855-1885," *Victorian Studies* 32 (1988): 55-83.

⁶⁵ *PP* 1864 vol. xiv, *SCMTS*, 176.

looks bad in Whetstone's Leicester there would come a time when the town would be forced to replace the Wicksteed system on the basis of complaints about the condition of the River Soar.

"Sewage for profit" was a dream that refused to die and it was given extended life by sewage irrigation systems. Lest we scoff at the tenacious notion of "sewage for profit" we should perhaps consider how our own society hangs much of its commitment to the recycling of solid waste on the possibility of recovering costs.⁶⁶ Before 1870 it was already obvious that farmers had little interest in purchasing town sewage whether in solid or liquid form and the opportunity afforded by irrigation, selling agricultural products rather than fertilizer, provided an attractive alternative.

It is an intriguing but unanswerable question to ask how Leicester would have reacted to the dual problems facing the Wicksteed system had Joseph Whetstone survived. "Economy" and public health were the foundations of his political life and it is possible that the two issues could have dovetailed with regard to sewage irrigation. Leicester had invested early and heavily in its sewerage system; naturally there would be a reluctance to consider the efforts and expenditures on the Wicksteed system as merely expensive mistakes. Could or would Whetstone have led the town council decisively into a new era that would have required further large investments? Sadly we shall never know.

Without Whetstone's leadership the Local Board was cognizant of problems but hesitant to act. By 1869 the sheer cost of the Wicksteed system had induced the corporation to commission civil engineer Baldwin Latham to design a new sewerage scheme with the understanding that his experience was with irrigation systems.⁶⁷ Latham's

⁶⁶ Dr. John Bohstedt draws an apt parallel between nineteenth century 'sewage for profit' and twentieth century reluctance to recycle, citing the abandonment of municipal recycling projects that did not break even financially. Moreover the parallel can be further drawn with reference to private companies in the recycling business with an eye to profit.

⁶⁷ Storey, *Historical Sketch*, 15.

proposed scheme would have made three important changes in the Wicksteed system without laying entirely new sewers. The change that appeared so divisive in 1870 was the conversion from lime slurry treatment to agricultural irrigation. To the town this was the most expensive change in the proposal because of the cost of the irrigation land. The Latham system offered other farsighted opportunities. At the break from "high" land Leicester to "low" land Leicester (see figure 2.1), Latham proposed an intercepting sewer that would direct the sewage to the existing "works" which would then become mere pumping stations for the new irrigation system. Ultimately this intercepting sewer would have prevented some of the worst human by-products from inundating the lower, primarily working class, sections of the town. Latham also proposed that rainwater from the lower sections be communicated directly to the river via new lines, while the lower sections' sewage should continue to be directed through the Wicksteed lines to the "works" and then to the irrigation farm.⁶⁸ By this strategy, Latham's proposal may have addressed the most telling deficiencies of the Wicksteed system. Amidst all the engineering subtleties and personal attacks, William Lee's report of 1852 had pointed out that Wicksteed "admits the sewers are neither adapted for the sewage alone, nor for the rain water; and he has failed to prove their adaptation for a practical combination of the two."⁶⁹

With scant attention to the rain/sewage problem the Chronicle urged the adoption of the Latham irrigation scheme. Citing the pecuniary success of irrigation systems at Croydon, Norwood, Aldershott, and Worthing, the Chronicle proclaimed that a "very great improvement with the sanitary arrangements of our large towns is on the eve of being adopted in many parts of England. Whether Leicester shall be foremost in the work or lag

⁶⁸ LC, 9 July 1870.

⁶⁹ LRO Pamphlets vol. 49, Report...also Remarks, 37.

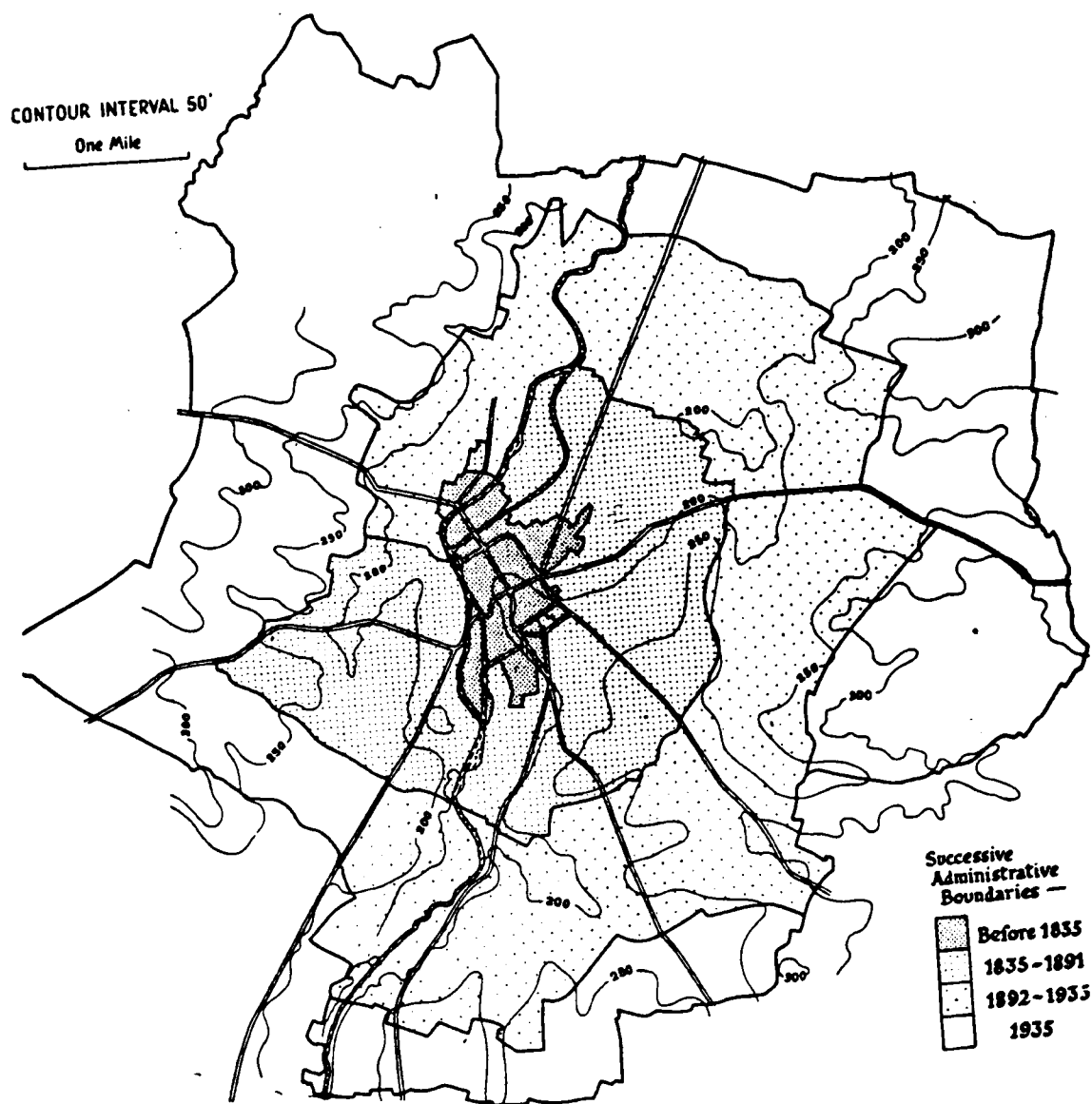


Figure 2.1 Contour map of Leicester

Source: R.A. McKinley, ed., The Victoria History of the Counties of England. A History of the County of Leicestershire, vol. 4, Leicester (London: Oxford University Press, 1958), 252.

behind, depends upon the Town Council and the ratepayers."⁷⁰ The Lancet also heaped praise on Latham's irrigation proposal. In 1870 the medical journal based its argument not on strictly public health considerations but on cost-effectiveness and the devaluation of manure.⁷¹ Consensus was forming in some circles, but not in Leicester, and never without reference to "sewage for profit."

The early 1870s witnessed fits and starts but little improvement in Leicester's sewers. Nothing was done about Latham's proposal; it was considered too expensive to rent the irrigation land.⁷² The Lancet lamented:

It is confidently affirmed that the sewers are exceedingly foul, that they are all but impervious [i.e. they were stagnant], that from insufficient ventilation the gasses escape into the houses through defective service drains, and that the single outlet is insufficient to take away the sewage when it is increased to any considerable extent by rain. Some time ago the subject of disposing of the sewage by irrigation was discussed; but, as usual, the landowners of the district are so blind to their own interests as to refuse to countenance the scheme. The Corporation is at this moment threatened with legal proceedings, the river Soar being in a very polluted state for many miles below the town.⁷³

Rather than invest a large sum to initiate an entire revamping of the Wicksteed system as Latham had proposed, the corporation contracted with the Phosphate Sewage Company to chemically treat the sewage at the existing works. The cost to the corporation was £1,000 per annum, less painful than the £6,312 annual estimate for Latham's system, but the corporation was still responsible for the maintenance costs and rather than receiving

⁷⁰ LC, 9 July 1870.

⁷¹ Lancet, 5 March 1870, 358.

⁷² McKinley, VCH 4, 278.

⁷³ Lancet, 17 December 1870, 864. No legal proceedings actually took place for several years.

a projected revenue of £24,000 per annum from irrigation products, the corporation would receive nothing.⁷⁴

The curious aspect of the decision to contract with the Phosphate Sewage Company was that the company itself did not advocate its own treatment method as an alternative to irrigation, but only as an adjunct to irrigation.⁷⁵ In fact at Tottenham the treatment had failed to meet national River Pollution Commission standards for purity.⁷⁶ Clearly the corporation chose the less expensive means of treatment. They had been promised the stars with Wicksteed's scheme, so skepticism about Latham's scheme was not unreasonable in the early 1870s.

It can be argued that the Wicksteed experience jaded the Local Board into minimal activity. I would further argue that the initial investment in the Wicksteed system brought reluctance to invest in later potentially disappointing schemes. Even partially remedial efforts were dealt with primarily with an eye to parsimony. For example the Privy Council's inspector, Robert Rawlinson, recommended venting sewer lines in the middle of roadways, but Leicester opted for the less expensive method of ventilating the sewers through factory chimneys.⁷⁷ The health benefits of transferring backed-up sewer gasses from basements to open-air ventilation are not measurable, but the factory chimneys that were employed in 1872 were far more scattered than Rawlinson's suggested street vents.

In 1873 there was a reputed falling out between Leicester and the Phosphate Sewage Company for reasons that are unclear. This led the Local Board to consider anew the prospect of a revamped system of sewerage. The Highway and Sewerage Committee

⁷⁴ *LC*, 13 August 1870, 20 January 1872.

⁷⁵ *Lancet*, 6 January 1872, 25.

⁷⁶ *LC*, 20 January 1872.

⁷⁷ *Lancet*, 6 January 1872, 25. A brief comment about the central government's health authorities may be useful. After the demise of the General Board of Health in 1858 some of its functions were taken up by the Privy Council until 1871 when the Local Government Board took over.

then sponsored a competition for a new scheme and the winner of the 200 guinea prize was the local architect J.B. Everard. It is said that a "modified version" of Everard's plan was submitted to Major Tulloch of the Local Government Board and this inspector rejected it on the grounds that it was too expensive and the raw sewage would be allowed to settle too close to the burgeoning town of Belgrave.⁷⁸

By 1874 there was growing pressure from outside Leicester. In early January there was a written complaint from Belgrave, downstream of Leicester, to the town council about the poor quality of the Soar.⁷⁹ This was merely a harbinger of things to come. By March, the Leicester had implemented the "Rochdale system" of human waste removal, a form of dry conservancy.⁸⁰ By this method excreta was regularly collected at night in pails provided by the corporation. According to Alderman Thomas Windley, chairman of the town council's recently formed Sanitary Committee, the Rochdale system was far less desirable than water closets, but the capacity of the water system to supply water closets was questionable and Leicester's sewers were clearly inadequate.⁸¹ The Rochdale system was not exactly inexpensive for the corporation. Initially every landlord who chose to participate in the Rochdale system was charged 10 shillings for the original pail. Above that level the corporation absorbed the costs. Within a month the cost to landlords had dropped to 5s.⁸² Landlords revelled in such an alternative to real improvements; by April there were 1,050 Rochdale pick-ups ordered.⁸³ This dry conservancy method did not

⁷⁸ The singular source for this paragraph is Storey, Historical Sketch, 16-17. This information is repeated by McKinley, VCH 4, 278 and Elliott, Victorian Leicester, 71. The quote is from Elliott. I do not have independent corroboration of these events and Tulloch's role in them seems a bit out of character.

⁷⁹ LC, 3 January 1874.

⁸⁰ Ibid., 14 March 1874. For a full discussion of dry conservancy see Wohl, Endangered Lives, 95-101.

⁸¹ LRO Pamphlets vol. 6, Thomas Windley, Notes on the Work of the Sanitary Committee of the Leicester Corporation from its Formation to the Present Time. 1873-1917, 2-3.

⁸² LC, 4 April 1874.

⁸³ Ibid.

expire for many years and neither did it solve the more expensive problem of the sewerage system.

Additionally in 1874, Leicester played host to the Midlands district chapter of the Association of Municipal and Sanitary Engineers. At this meeting the engineers were treated to a tour of the Wicksteed "works," which the Borough Surveyor, E.L. Stephens, claimed that he had spent seventeen years improving.⁸⁴ Responding to a revealing question from one of the guests, Stephens explained that the process took two years to compress and dry every single year's solid sewage.⁸⁵ In addition to this precarious lag time, the poor marketability of the manure bricks eventually led to an excess inventory of 5,000 tons of processed sewage.⁸⁶ Thus both the wet and the dried sewage were creating bottlenecks in this troubled system.

If 1874 was a year of retrenchment and complacency, 1875 was a year of positive drama regarding the Leicester sewerage system. The Local Board commissioned yet another proposal for a new scheme. This time it was the venerable Sir Joseph W. Bazalgette, architect of the vaunted London system, that was hired to submit a plan. Ironically Bazalgette's scheme for the metropolis was based on Wicksteed's conceptions of intercepting main lines and steam powered pumps.⁸⁷ Moreover Baldwin Latham had based part of his proposal on the perceived success of the capital's new system. The problem with Bazalgette's plan for Leicester was most obviously the expense. The investment by the corporation for this scheme would have involved some £300,000.⁸⁸

⁸⁴ LC, 21 March 1874.

⁸⁵ Ibid.

⁸⁶ PP 1885 vol. xxxi, Royal Commission on Metropolitan Sewage Discharge, Minutes of Evidence, 9.

⁸⁷ The Engineer 32 (1 December 1871): 383; Proceedings of the Institution of Mechanical Engineers (1872): 23.

⁸⁸ Read, Modern Leicester, 20; McKinley, VCH 4, 279; Elliott, Victorian Leicester. . Bazalgette's actual plan for Leicester eludes me so I am relying on these sources here.

After quickly rejecting Bazalgette's scheme, the corporation moved to include several nearby towns in its 1875 sewage proposal; significantly all of these towns were upstream of Leicester.⁸⁹ Meanwhile, the Buck-Franklin report, which will be treated in greater depth later in this paper, accused the "imperfect outfall" (i.e. poor drainage due to too gentle a fall to the River Soar) of the existing system of being the prime cause in the town's excessive infant mortality.⁹⁰ But the Local Board, led by the Tory William Winterton, was more decisive in its effort to fully acquire the waterworks company rather than to undertake an expensive reworking of the sewerage system. While water supply turned a profit, sewage remained a financial loser.⁹¹

The devastating floods of late July 1875 returned attention to the sewerage system. In a town known for flooding the Chronicle observed that the inundation was the worst in twenty-three years.⁹² The connection between this natural disaster and its attendant cost to public health was publicized and pointedly directed at sewerage deficiencies by the newspaper. Immediately after the floods, the Chronicle's rhetoric became more strident. The newspaper editorialized "that the evils arising from the defects in the sewerage system, in the low-lying districts, have again been alarmingly intensified and multiplied by such inundations, with their inevitable trail of disease germs."⁹³ A week later, the newspaper was replete with references to the flood and its effects. The "long neglected question of sewerage reform" should convince the corporation "that they are rapidly approaching a crisis, when no mere half-measures, or patchwork additions to the present costly and inadequate system will avail." Further, "[s]o clear, indeed, is the connection between the

⁸⁹ LC, 3 July 1875.

⁹⁰ LRO 20 D 72/60, W. Elgar Buck and George Cooper Franklin, Report on the Epidemic Diarrhoea of 1875 (Leicester: Spencer Brothers and Russell, [1875]), 31.

⁹¹ The decision to buy the waterworks company outright was taken on 31 March 1875 but awaited Parliamentary approval. LC, 3 July 1875.

⁹² LC, 24 July 1875.

⁹³ *Ibid.*

choked-up sewers, the excessive mortality among infants, and the wide prevalence of disease among adults, that the inevitable cost of the delay of "six or seven years" may be roughly gauged in the sacrifice of hundreds of human lives, and a degeneration in the stamina of adults so great as it is incalculable."⁹⁴ The Chronicle used the disaster to again advocate irrigation; "[m]any schemes will doubtless be considered only to be sooner or later rejected; but there is only one which has now stood the test of practical application... and that is sewage irrigation."⁹⁵

The Chronicle did not speak for the corporation of Leicester. The Tory Alderman William Winterton claimed that flood victims were "very much in the hands of providence"⁹⁶ but the corporation had "done its duty" if it did not "inflict too heavy taxation on them [the ratepayers] to get these alterations made."⁹⁷ Beyond that, "they must leave the rest to Providence."⁹⁸ Although the Liberals outnumbered the Conservatives by 36 to 20 in the 1875 town council, Alderman Winterton's fatalism spoke for the Local Board in the pages of the Liberal paper. The Chronicle printed Winterton's remarks in support of its own political position on public health, yet it is significant that Winterton's do-nothing approach was satisfactory to the Local Board as a whole. Moreover in 1876 Winterton would be the first Conservative mayor elected by the reformed corporation. While no significant changes in Leicester's sewerage system occurred in 1875 the legacy of that year would only add to the pressures on the town to reform its system.

Fits and starts continued through the 1870s, but fits were becoming more frequent, and starts less convincing. Alfred Ellis, writing in 1876, complained that "[t]he impurity of

⁹⁴ LC, 31 July 1875.

⁹⁵ Ibid.

⁹⁶ LC, 7 August 1875.

⁹⁷ Ibid.

⁹⁸ Ibid.

the river at Belgrave has been increasing with the population of Leicester."⁹⁹ In Belgrave, "[f]or many years past, during the summer months, the annoyance from the river has been very great, and as the evening vapour rises the stench is often sickening."¹⁰⁰ Dr. Sloane, a member of the town council and a physician, criticized the sewerage system for its inability to handle heavy rainfall; pumps at the "works" were inadequate to dispose of the untreated "liquid," so floodgates would be opened and raw sewage was communicated with the Soar.¹⁰¹ While I might criticize Dr. Sloane's theory of disease transmission later in this paper, there is no reason to doubt his powers of observation.

When John Storey, Samuel Stone's eventual long-term replacement as town clerk, reflected on 1877 he wrote that a mere extension of the Wicksteed "works" "enabled the Corporation to "drag on" for some few years without solving, or without making any great effort to solve, the difficult problem which lay before them as to an improved sewerage system."¹⁰² In 1878 strengthened by Dr. William Johnston's "Zymotic Report," the Chronicle averred that a new "sewerage scheme is year after year laboriously struggling into birth."¹⁰³ The Local Board was no longer running contests or consulting with eminent engineers about the sewerage system; Borough Surveyor E.L. Stephens, the one who had been "improving" the Wicksteed system for decades, was the man responsible for the system. It would be too simple to blame Stephens for the recalcitrance of the entire town; Stephens was a functionary of the town and his actions were consistent with the councillors who were content to tinker with the ineffectual system since the 1860s.

⁹⁹ LRO Pamphlets vol. 63, Alfred Ellis letter of 6 June 1876 quoted in John Sloane, Report on the Infantile Diarrhoea of Leicester [1876], 26.

¹⁰⁰ *Ibid.*, 27.

¹⁰¹ LRO Pamphlets vol. 63, John Sloane, Report on the Infantile Diarrhoea of Leicester [1876], 30.

¹⁰² Storey, Historical Sketch, 18.

¹⁰³ LC, 30 March 1878.

Yet Stephens' death in 1880 ushered in an era of enthusiasm and innovation.¹⁰⁴ Stephens' successor, Joseph Gordon, immediately embarked on a program to flush and ventilate the existing sewers at an approximate cost of £12,000.¹⁰⁵ This began as the stench in Leicester had reached the point where "we must e'en hold our noses and open our mouths" according to one Robert Read.¹⁰⁶ By the time Gordon took the position, local reformers, neighboring towns, and finally the central government increased pressure on the town to make more far-reaching improvements and there were plenty of examples of more successful sewerage systems.

In the cleansing and ventilating project, Gordon exhibited the imagination that would characterize his later work. Not content with Rawlinson's recommended sewer vents, Gordon placed them in the streets twice as frequently as the inspector suggested.¹⁰⁷ Moreover the surveyor set upon the separation of storm drains from foul sewers, laying 4.93 miles of new lines.¹⁰⁸ This first comprehensive cleansing of the Wicksteed system caused numerous cases of diarrhoea, and four cases of typhoid, among the workmen,¹⁰⁹ but led some observers to praise the improved flow of the lines and the reduced pressure for the lines to handle both sewage and storm runoff.¹¹⁰

Despite the apparent successes of the cleansing and ventilating project neighboring towns still lodged numerous complaints about the condition of the River Soar. The Local Government Board convened an investigation in Leicester at the behest of Belgrave and

¹⁰⁴ LC Supplement, 2 October 1880.

¹⁰⁵ Read, Modern Leicester, 21.

¹⁰⁶ Ibid.

¹⁰⁷ LRO 20 D 72/4, William Johnston, MOH 1881, 25-36. In one 4 1/2 mile section of the existing sewer lines vents were increased from 2 to 51 and manholes, which provided access to the lines, were increased from 8 to 101.

¹⁰⁸ LRO 20 D 72/4, William Johnston, MOH 1883, 58. Eventually 11.53 miles of new sewers were laid of which 91% were storm lines. LRO 20 D 72/4, William Johnston, MOH 1884, 47.

¹⁰⁹ LRO 20 D 72/4, William Johnston, MOH 1881, 36.

¹¹⁰ LC, 31 March 1883. In addition to the Chronicle's editorial admiration the newspaper reprinted one Henry D. Dudgeon's letter to the London Echo bearing the same sentiments.

Barrow-upon-Soar in 1884. Belgrave acted for both towns as the "complainant" before the Local Government Board inspector and arbiter of the dispute, Major Tulloch, while John Storey acted as the "defense" for Leicester. The proceedings were nothing if not adversarial. Belgrave presented witnesses testifying to the river's pollution and argued that Leicester, as the cause of the nuisance, was responsible for its rectification. Storey countered with a lengthy defense that mixed legalisms and a litany of excuses. One curious feature of Storey's defense was that he called Islington's MOH, Dr. C.M. Tidy, to testify that Leicester's sewage treatment was superior to irrigation. Leicester's MOH, Dr. Johnston, was present at the hearing, but was not called to testify. Johnston's criticism of the system may have forced Storey to search farther afield for a supporter. Following the hearings Tulloch toured the Soar and the "works". Ultimately, the inspector ruled against Leicester.¹¹¹ This binding ruling by an agent of the central government would mark the beginning of the end of the Wicksteed system.

Joseph Gordon was obviously prepared for such an eventuality. Before the end of the year, the Borough Surveyor presented eight possible new sewerage schemes to the Highway and Sewerage Committee. All eight of the potential systems conformed to Tulloch's insistence that the sewage be put into an irrigation system, regardless of whether or not it was treated chemically. Tulloch's point was that chemical treatment was not at a state that sewage, treated or untreated, should be fed back into the Soar. Inexplicably Dr. Tidy was now in full agreement with the consensus on irrigation. Gordon's proposals would have cost between £116,700 and £229,600 to construct, with an additional £100,000 or more for the irrigation land itself.¹¹²

¹¹¹ LC, 27 September 1884.

¹¹² LRO Pamphlets vol. 63, Joseph Gordon, Report to the Highway and Sewerage Committee on Various Schemes for a further Purification of the Sewage of Leicester (1884).

In the mid-1880s, the Chronicle proclaimed that the "[s]anitary reformers are now a power in the borough."¹¹³ This is probably most evident in the town's hiring practices at the time. Gordon was an innovator; his contemporary, Dr. Johnston, was a famed innovator; and Johnston's successor, Dr. Henry Tomkins, was that rare combination of scientist and practitioner. The town was less decisive in other matters. The Highway and Sewerage Committee wrangled over Gordon's proposals and submitted an incomplete plan to Tulloch in 1885. Rather than delay the process by requiring that every nuance of the plan be set forth in great detail as had the General Board at mid-century, Inspector Tulloch approved the scheme and returned it to the Local Board for finalization.¹¹⁴

By early 1886 the council had honed down the eight Gordon proposals. Sewage irrigation was accepted as the method of treatment and Beaumont Leys was accepted as the site for the irrigation. The final point of dispute was whether to lay entirely new sewer lines or to extend the storm sewer lines of Gordon's cleansing and ventilating program. Gordon himself was polite but firm; 14.761 miles of entirely new sewer mains were essential.¹¹⁵ The town council accepted this most expensive provision of Gordon's scheme and spent a great deal to acquire rights to the Beaumont Leys irrigation farm, but the lines that were laid were somewhat less expensive than state of the art glazed earthenware pipes.¹¹⁶ A combination of brick and pipe were used on the new system, but the main lines were primarily pipe. With this final nod to "economy," Leicester embarked on a sewerage solution that, when completed in 1891, would remain in operation until 1965.

If a moral can be inferred from Leicester's sewerage experience in the more than four decades from 1848 to 1891, it is not a rosy commendation of innovation. Innovation,

¹¹³ LC, 31 March 1883.

¹¹⁴ Lancet, 5 September 1885, 461.

¹¹⁵ LRO Pamphlets vol. 63, Joseph Gordon, Report to the Highway and Sewerage Committee on a Proposed System of New Main Trunk Sewers for the Borough (1886).

¹¹⁶ LRO 20 D 72/5, Henry Tomkins, MOH 1890, 28-30.

pushed through on the strength of Wicksteed's vaunted engineering reputation and Whetstone's tenacity and good intentions, left Leicester saddled with an inefficient and ultimately dangerous scheme. But such "heroes" are only part of the explanation. Two concepts, that is two socially constructed phenomena, proved decisive. First, the early and durable consensus around "sewage for profit," made it possible for Whetstone to push through Wicksteed's system as an economically palatable solution. Second, the eventual development of an accepted remedy around irrigation highlighted the defects of the Wicksteed system and permitted at last the move to a different system.

"Sewage for profit" was clearly a consensual concept in the mid-nineteenth century. While sewerage reform was recognized as a boon to public health, it was not divorced from pecuniary gain in this period. In fact Dr. Henry Tomkins, Leicester's MOH, visited Berlin's sewage irrigation farm in 1890 to see if the Germans' profits could be duplicated in the Midlands.¹¹⁷ At mid-century, reformers such as Chadwick, engineers such as Wicksteed, and local leaders such as Whetstone, all sought a sizable recompense for the expenditure of money on a sewerage scheme. Sewage turned out not to be profitable, except in Berlin, and it was necessary for the idea to lose its untouchable status before real solutions could take its place.

By the late 1860s, what I would term an accepted remedy had developed around sewage irrigation as a method of treatment. Although "sewage for profit," or at least to break even, remained a secondary goal, irrigation was proving to be a salubrious way to dispose of waste. While no disposal method could compensate for poorly designed sewer lines, an irrigation system permitted the percolation of transmitted waste into the subsoil in locations where it could do little harm. Thus, one of the great problems of Victorian towns, river pollution, could be ameliorated along with the removal of dangerous waste

¹¹⁷ Ibid., 31-32.

products from residential areas. It should be remembered that river pollution was at least one of the most important driving forces in sanitary reform; this is evident from Hamlin's study as well as the "Great Stink" of the Thames in 1858. What made Leicester unique, and dictated so much of its sewerage history, was that the town did not wait for some private or corporate party to take it to court before it initiated its sewerage project. But by 1884 it would take neighboring towns and the Local Government Board to pressure the town council into another major investment in sewerage. The price for precocity was high. Evident failure in the 1860s was not enough to change the system. An accepted remedy in the 1870s did not incite the town to activity because it was deemed too expensive. Natural disaster in 1875 could not end indecisiveness. A changing of the guard in 1880 only brought partial measures. Only outside pressure, in 1884, could force Leicester to drastically re-work the system it had fought so hard for in midcentury. Hamlin is vindicated in this tale; extra-corporation action was eventually necessary to make Leicester conform to the accepted remedy, but it is a different tale from Hamlin's. Leicester was vigorous and innovative in the shadow of 1848; it was strong and independent, more independent than the General Board of Health would have liked. But, once such a dramatic and expensive scheme had been put in place it was not easy to admit, and even more difficult to pay for, failure. We can not know if the broad shoulders of Whetstone and Stone could have changed the council's actions; we do know that no one quite took their places.

3. "When doctors differ, who shall decide?"¹

Perhaps no nineteenth century public health issue was more problematic to British reformers than infant mortality. In at least one sense it remains so for historians today. Composite and adult death rates dropped in the second half of the nineteenth century, most markedly after 1870, but infant mortality remained stubbornly high into the twentieth century.² From 1849 to 1891 infant mortality averaged about 151.7 per 1,000 live births in England and Wales.³ For the fifteen year period 1846 to 1860 the figure was 155.7, from 1861 to 1875 it was 153.7, from 1876 to 1890 it was 142.7. This slight but seemingly steady decline was reversed in the next fifteen year period to 148.3. Pronounced and continuous declines did not begin until after that point.⁴ There were many causes of the high infant mortality rates in Britain; only one "cause" and one town will be explored in this paper.

For better or worse the one cause of infant mortality that brought notoriety and consternation to Victorian Leicester is one of the more provocative challenges to medical history; the one cause that perennially placed Leicester among Britain's most lethal towns for infants was diarrhoea. This is a problem for medical historians because of the multiplicity of disorders that could lead to a Victorian diagnosis of diarrhoea. It is a problem in the history of public health because of the stresses and interactions within a community that concerned itself with this "disease." The community was made up not

¹ Robert Read, Jr., Modern Leicester: Jottings of Personal Experience and Research, with An Original History of Corporation Undertakings, and of each Regular, Militia, Yeomanry, & Rifle regiment localised at The New Military Centre (Leicester: Winks & Son, 1881), 18.

² General discussions of infant mortality can be found in Anthony S. Wohl, Endangered Lives: Public Health in Victorian Britain (Cambridge, Mass.: Harvard University Press, 1983), 10-42 and F.B. Smith, The People's Health 1830-1910 (London: Croom Helm, 1979), 65-135. A chapter on infant mortality in Leicester can be found in Malcolm Elliott, Victorian Leicester (London: Phillimore & Co., 1979), 86-99.

³ Smith, The People's Health, 65.

⁴ Ibid.

only of Leicester's residents and their leaders but also health officials on local and national levels repeatedly goaded by the local and medical press. Because diarrhoea seemed to respect socio-economic boundaries it was sometimes considered to be a predictable, if painful, consequence of nature and poor breeding. But because diarrhoea defied attempts to rationally and conclusively determine its cause numerous more or less vague theories were posited. In the absence of a known agent of disease (as in smallpox) or a known vector of disease (as in cholera) much attention was directed to the site where diarrhoea was most destructive. Whereas all British towns suffered the loss of children from diarrhoea every year, it became a problem associated specifically with Leicester in part because of the very high death rate but also from a lack of other targets.

To Leicester, the dialogue of diarrhoea was as important as the "disease" itself. There are two ways to substantiate the importance of discussion and debate in the construction of the "disease" as a problem that Leicester became responsible for solving. First, documentary evidence will show that local office holders explicitly responded to negative characterizations of the town in the medical press. Second, critics focussed on Leicester's "excess" mortality, although diarrhoea was common in English towns. That Leicester could have an excess of the "disease" implies that there was an acceptable level of diarrhoea mortality. Certainly there were levels of diarrhoea mortality that would not bring national attention to a town.

One critical reason that diarrhoea was often treated with rhetoric and theorizing is precisely because the "disease's" victims were infants. Adults might have felt sadness and frustration in dealing with diarrhoea but they would not have felt panic.⁵ Unlike cholera or smallpox, diseases that could cause panic, adults did not see their peers dying from diarrhoea; they did not truly have to fear for their own lives. This slight emotional

⁵ For a discussion of parental reactions to the deaths of children see Ellen Ross, *Love and Toil: Motherhood in Outcast London 1870-1918* (New York: Oxford University Press, 1993), 181-94.

detachment and the predictable visitations of the "disease" helped to make diarrhoea the subject of a number of inquiries with varying degrees of rationality and limited urgency. Whether they were conducted by local, national, or independent investigators these investigations always involved Leicester.

In his annual report for 1884, Leicester's MOH William Johnston provided a twelve step description of the course of the "disease" and the symptoms associated with each phase:

1. Irritable, feverish, sleep disturbed
2. Bowels slightly loose, odor worsens
3. Vomiting episodes, sour odor
4. After 2 days, symptoms 1 through 3 become more pronounced
5. Frequent crying, high fever
6. Very frequent bowel movements, bad odor, unable to keep baby clean
7. Vomits all nourishment
8. Extreme thirst
9. All "baby fat" lost, extremities shrivel, fontanelle sinks
10. Continuous moaning rather than crying
11. Purging continues unabated
12. Death or recovery (first sign of recovery is a less offensive odor from excreta).⁶

Whether death resulted from pitiful dehydration or violent convulsion the condition that caused such mortality was referred to as "infantile" diarrhoea or "summer" diarrhoea. These terms merely categorize rather than define a disease. The adjectives are hardly specific; mortality was highest among infants and in hot weather but that does not narrow the field of potential causative agents greatly. Several diseases that resist eradication in our society have etiologies that resemble that of diarrhoea. *Salmonella*, *shigella*, *E. coli*, and *cryptosporidium* could all have been spread in the conditions that existed in Victorian Leicester. These are cited as examples rather than hypotheses but any diarrhoea-like disease would be exacerbated by poor waste and refuse removal or poor hygienic practices.

⁶ LRO 20 D 72/4, William Johnston, MOH 1884, 22-23.

In a densely populated, poorly drained town with low-lying sections that experienced periodic flooding it is not surprising that Leicester had high rates of diarrhoea.

This paper will be concerned with the conditions that were favorable to the diffusion of the "disease" rather than with a full biological description, or etiology. Naturally it would be helpful to have such an etiology and perhaps Dr. David C. Reeder's current work on the problem will yield a solution.⁷ But a history of public health in Leicester can hardly be written if one waits for definitive etiological explanations that were unavailable to the aforementioned community. Just as it is impossible to understand Leicester's reticence to install a "modern" system of sewerage without knowing the history of the Wicksteed system, it is impossible to understand other public health issues in Leicester without recognizing the reputation that the town acquired because of its diarrhoea mortality. Anne Hardy's recent volume on infectious diseases, The Epidemic Streets, sidesteps diarrhoea because it "has a hugely complex history, and merits more detailed attention than can be given here."⁸ But Hardy's work focuses on London; such a proviso will not suffice in a discussion of Leicester.

The reputation that Leicester acquired was based on the very real mortality that existed in the town to be sure, but without the visibility afforded to the town by the statistical reports of mortality by the national Registrar-General (formally known as the General Register Office) the pressure to solve the problem would have been less intense. The Registrar-General's comparative mortality statistics were compiled weekly, monthly, quarterly, and annually and made available to the press. The independent medical press, represented by the Lancet, seized upon the statistics to criticize the town's "sanitary authorities." The local press publicized the Registrar-General's data and often editorialized

⁷ David C. Reeder, "Infant Mortality in Leicester 1860-1920," (1993), unpublished paper, photocopy obtained from the Centre for Urban History, Leicester University.

⁸ Anne Hardy, The Epidemic Streets: Infectious Disease and the Rise of Preventive Medicine (Oxford: Oxford University Press, 1993), 3-4.

on the problem. Such attention made Leicester's health officials self-conscious and led directly to some investigations.

Through the second half of the nineteenth century the problem of diarrhoea received more and more attention as it refused to yield to "progress." Raw mortality from the "disease" in Leicester does not appear to have been a simple function of population growth (see figure 3.1). Moreover the town consistently ranked first or second in mortality from diarrhoea whether this was calculated per thousand living or per thousand births.⁹ Agents of the town made numerous attempts to ascertain causes for the malady with a heightened sense of urgency when the medical community was most vocal but the community had no accepted remedy. The complexity of diarrhoea hampered all such investigations. Crude miasmatic theory was falling out of favor (a gradual and variable process) but notions of disease that replaced it tended toward a unicausal approach, that is, that a particular organism, biochemical reaction, or vector was anticipated for a particular symptom or disease. Identifying such an association often led to the development of an accepted remedy, at least as far as causation was concerned. The best example of this would probably be cholera. After Dr. John Snow's detailed investigation of cholera in 1854 it became roundly accepted that contact with an infected water source was the mechanism of transmission.¹⁰ But investigations of diarrhoea did not yield such definitive results and therefore no accepted remedy developed during the period under study. These investigations will be considered in their temporal contexts.

⁹ The Leicester Chronicle regularly reported the Registrar-General's comparative returns as did the Lancet. Sparing use will be made of the returns from short periods here and annual figures will be taken generally from MOH reports.

¹⁰ M.W. Flinn, introduction to Report on the Sanitary Condition of the Labouring Population of Great Britain, by Edwin Chadwick [1842] (Edinburgh: Edinburgh University Press, 1965), 63. For the period before Snow's investigation, see R.J. Morris, Cholera 1832: The Social Response to an Epidemic (New York: Holmes & Meier, 1976).

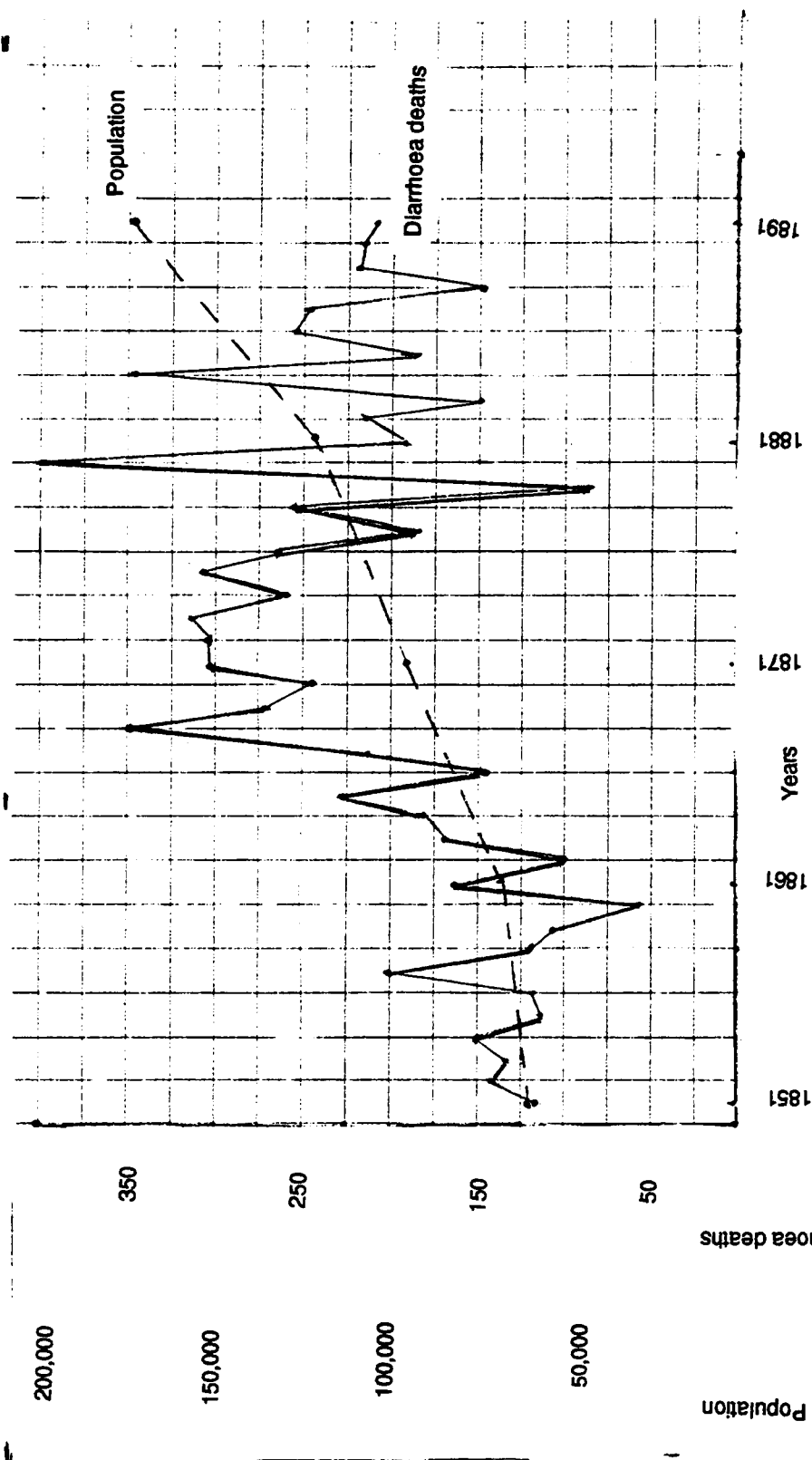


Figure 3.1 Diarrhoea deaths and population growth in Leicester 1851-1891

Sources: Annual Reports Of the Medical Officers of Health 1851-1891, Leicestershire Record Office LRO 20 D 72/2, 20 D 72/4, 20 D 72/5, L.614; Barry Haynes, Working-Class Life in Victorian Leicester. The Joseph Dare Reports (Leicester: Leicestershire Libraries and Information Service, 1991), 10, 96.

It is difficult to determine exactly when diarrhoea mortality came to be perceived as a notable problem in Leicester. Local deaths were first tabulated in 1850 by Leicester's Medical Officer of Health (MOH), John Buck. Dr. Buck was sufficiently familiar with the "disease's" patterns that he made note of the fatalities only between August and October of the years 1850 and 1851. The third quarter of the year would remain by far the most fatal from diarrhoea throughout the period.¹¹ In addition to the time of year Buck considered little more than the ages of the victims in his analysis. Recognizing that only the very young and the very old perished from the "disease," and that these victims were more homebound than the general population, Buck speculated that some type of "organic poison" was acting in people's homes.¹² He hesitated to make bolder statements than this and showed some foresight but he seemed to expect a single cause. "Whatever may be the qualities of the subtle and hitherto unrecognized agent which operates in producing such dire effects, will probably long remain a matter for scientific investigation."¹³

Through the 1850s annual diarrhoea deaths never dipped below 100 and in 1857 topped 200. Nonetheless concern about the deaths during this decade was restricted to a circumscribed group. Of course families of victims experienced immeasurable loss but few civic leaders in Leicester raised an alarm. Joseph Dare, Unitarian missionary to the working class, wrote in 1852: "I have officiated at the Cemetery when as many as sixteen children have been buried in one day. The districts of the poor in this town are become a very Rama, filled with the lamentation and weeping of mothers over the loss of their little ones."¹⁴ Dare's implied social distinction of the "disease" was geographically corroborated

¹¹ This is shown graphically in Hardy, *The Epidemic Streets*, 185.

¹² LRO L.614, John Buck, *Annual Report of the Medical Officer of Health for 1851*, 11. [hereafter *MOH 1851*].

¹³ *Ibid.*, 10.

¹⁴ Joseph Dare (1852); quoted in Barry Haynes, *Working-Class Life in Victorian Leicester: The Joseph Dare Reports* (Leicester: Leicestershire Libraries and Information Service, 1991), 44.

by the new MOH and former town councillor, John Moore, in 1853. Dr. Moore looked a bit more closely at the deaths than did Buck, and by "comparing the localities where Fever and Diarrhoea have been most prevalent during the years 1851, 1852, and 1853, I find but little difference; they prevail principally where sewerage is either entirely wanting or very defective."¹⁵ While these conditions might have described much of the town in 1853 they would have been particularly acute in poor or working class neighborhoods which tended to be overcrowded and often built on land with poor natural drainage.¹⁶

Diarrhoea occasioned little more comment from Moore in the 1850s. The MOH dutifully recorded the deaths each year but did not expound on the problem again until 1861. The year 1861 was not good for diarrhoea mortality in Leicester but it was still short of the 202 deaths in 1857. What prompted Moore to comment in 1861 was a sharp jump in fatality compared with 1860 that could not be correlated with hot weather or anything else. As yet Leicester was not experiencing any outside pressure on the matter, so Moore had no reason to be less than forthcoming in his assessment that

[t]he increase of mortality from this disease, so far as it respects our own locality, does not appear to arise from any known cause. Hot and sultry weather certainly predispose to it, and an indulgence in Fruits, etc., when they are abundant is frequently an immediate cause; but neither of these existed in 1861, on the contrary, the Summer and Autumn were most congenial and fruit very scarce, but nevertheless, we find an increase in the mortality from this disease of from 56 in 1860 to 160 in 1861.¹⁷

¹⁵ LRO L.614, John Moore, MOH 1853, 4.

¹⁶ Elliott, Victorian Leicester, 101-03. Elliott writes that overcrowding in Leicester was not as bad as in some other towns such as Manchester.

¹⁷ LRO 20 D 72/2, John Moore, MOH 1861, 5.

Moore's candor about his own ignorance of the cause enabled him to objectively address other contemporary notions. How firmly anyone held to a "fruit theory" is open to question but by 1865 Moore believed that he had enough experience with the "disease" to eliminate this as a cause.¹⁸ The MOH encapsulated his view

that it should arise from some epidemic cause, of which we have no cognizance. At the season of the year when these diseases are most prevalent, there is always a large amount of vegetable refuse, which is frequently allowed to accumulate until decomposition takes place: a more frequent removal of this refuse would tend, in some measure, to lessen the amount of these diseases, as well as others of a zymotic character.¹⁹

In the 1860s average annual diarrhoea mortality increased by some 71% from the previous decade.²⁰ This outpaced population growth from 1861 to 1871 by 31%, and total growth from 1851 to 1871 by 14%.²¹ By 1868 Leicester crossed a threshold that had less significance numerically than it had rhetorically. In 1868, three hundred forty-nine people died of diarrhoea in Leicester. Not only was this 140 more than in the previous year but this was the first time that more than 300 deaths had been reported in any single year. In raw numbers this was four times as many deaths as in London in 1868²² a fact which caught widespread attention.²³

¹⁸ LRO 20 D 72/2, John Moore, MOH 1865, 8.

¹⁹ Ibid. "Zymotic" is a term that was coined by Dr. William Farr and for the purposes of this paper it may be loosely defined as infectious.

²⁰ Average annual diarrhoea mortality from 1852 to 1861 was 128.6, from 1862 to 1871, 219.5. Averages are used here because of annual variability.

²¹ Population growth from 1861 to 1871 was 40%, from 1851 to 1871, 57%.

²² Jack Simmons, Leicester: Past and Present, vol. 2, Modern City 1860-1974 (London: Eyre Methuen, 1974), 13.

²³ Comparative figures over short or relatively short periods of time were very important in heightening awareness, more important for this purpose than their statistical significance. Because of a myriad of factors affecting specific outbreaks only trends are of ultimate importance. Thus the drastic sounding comparison between Leicester and London in 1868 could have been an aberration and carries less significance than the perennial ranking of Leicester at the top of the list in terms of diarrhoea deaths per 1,000 population or 1,000 live births.

Notice was taken of the situation in 1868 by the Registrar-General and this information was given publicity by the Lancet.

In his September Quarterly Report, the Registrar-General, referring to the excessive diarrhoeal mortality in Leicester, remarked that there must exist 'conditions exceptionally favourable to the diffusion' of that disorder. The Local Board of Health, acting upon this suggestion, forthwith nominated a Sub-committee (including members of the medical profession) to take the matter into consideration, and to report thereon. A document now before us, addressed to the Board by Mr. James Thompson [Chronicle publisher and council member], at whose instance the Sub-committee was appointed, shows pretty clearly that the Registrar-General's surmise was correct. Mr. Thompson speaks of 'the enormous number of open cesspools scattered all over the town;' the number of pigsties, slaughter-houses, and stables; the inefficiency of some of the main sewers; and 'the introduction into wells, by percolation, of the emanations from cesspools, the water being drunk by the inhabitants of the locality.' Little wonder, then, that diarrhoea should abound particularly during a season of unusual dryness and heat. Judging from Mr. Thompson's statements, the main sewer, instead of being, as it ought to be, an instrument of defence against disease, is, by its bad construction, a source of constant danger.²⁴

While neither the Registrar-General nor the Lancet could be specific about any causative agent it is clear that the medical journal endorsed Thompson's association of the "disease" with the troubled sewage system. The Lancet was especially concerned with the

²⁴ Lancet, 20 March 1869, 418.

lack of mortar to cement the bricks in the deeper sections of the Wicksteed system. This deficiency permitted sewage to leach directly into soil and indirectly into basements.

The Medical Officer of Health for Leicester in 1868 was the recently appointed Dr. J. Wyatt Crane. The annual report of the MOH for 1868 could hardly ignore that year's death toll from diarrhoea but Crane went far beyond his predecessors in assigning a cause to the "disease." Where Buck had timidly offered a "homebound theory" and speculated on the complexity of the disorder, and Moore had dismissed the "fruit theory" and correlated the problem with refuse, Crane brought forth another theory that assured subsequent controversy. Seeming to belong to an earlier era, the bold statement that served as Crane's emblem for a decade was "I believe that simple heat is the cause of Summer Diarrhoea in this country."²⁵

Crane's "simple heat theory" was open to criticism on its face but the doctor added fuel to the fire. According to Crane solar heat relaxed the digestive tract giving rise to an inability to digest foods that would be innocuous in cooler temperatures. Crane expected that all ages of people would experience diarrhoea in hot weather but the disorder would prove fatal to "weakly children."²⁶ As Crane was forced to defend his theory he developed and elaborated it; "weakly children" were the result of factory labor. The MOH conceived of factory work as a physically degenerating way of life, that is, robust individuals who worked in factories (or workshops) gradually weakened in strength and stamina. Moreover Crane believed that this weakening was somehow heritable, so that the second generation of factory laborers would be more susceptible than the first, the third more degenerated than the second, and subsequent generations would spiral ever downward in

²⁵ LRO 20 D 72/2, J. Wyatt Crane, MOH 1868, 23.

²⁶ LRO 20 D 72/2, J. Wyatt Crane, MOH 1871, 15.

their ability to resist this "disease."²⁷ So Crane's "simple heat theory" became more complicated as it implicated an economic and social system.

Crane's theory appeared to be eminently vulnerable with regard to "simple heat" so many of his detractors did not indulge themselves in the issue of progressive factory debilitation over generations. "Simple heat" made skeptics of laymen as well as medical professionals and laymen felt qualified to comment on a theory that sounded as simplistic as "simple heat." In September of 1871 Crane appeared before the town council to justify his position. Prior to this episode Crane's theory had been the subject of three rather negative editorials in the Lancet.²⁸ While the Lancet articles were not blatant personal attacks on Dr Crane (perhaps out of professional courtesy) in the September meeting one town councillor took the "simple heat theory" to its logical yet absurd conclusion. William Barfoot, the councillor who had requested Crane's presence at the meeting, acknowledged that criticism from outside Leicester led him to raise the subject and read an anonymous letter from "a gentleman of very high scientific attainments."²⁹ The letter, dripping with sarcasm, read in part:

Don't let the ratepayer's money be squandered in what up to now has been called sanitary reform. Don't let us waste our time in ventilating the sewers, in examining the system of drainage and the details of it; let the cesspools flourish and the wells in their close proximity be left for the inhabitants to drink from. It is the heat, and the heat alone that is the cause of this plague. I should suggest that the Board of Health advertise for a square mile of awning to shade the town of Leicester from the sun's rays, and agree with the Waterworks

Company to keep it constantly wet with streams of water from Bradgate. 'Then' I

²⁷ LRO L.614, J. Wyatt Crane, MOH 1874, 8.

²⁸ Lancet, 20 March 1869, 418; 24 April 1869, 577; 8 April 1871, 489.

²⁹ LC, 30 September 1871.

confidently predict there will be no more 'massacre of the innocents' and Leicester will be the healthiest town in England, and the Officer of Health will have immortalised himself as a sanitary reformer.³⁰

Barfoot continued the sarcasm a bit farther by saying "[i]f they adopted the heat theory, it would give the Local Board very little trouble. They might dispense with their sanitary inspectors certainly."³¹

The humorous tone that Barfoot's letter brought to the council meeting was continued by Dr. Crane. I would suggest that the use of humor at all helps to illustrate that there was no panic in the town despite the hundreds of annual deaths. After Barfoot's remarks Crane set about to defend his position but he prefaced his argument with a witty rejoinder to Barfoot on the long-windedness of politicians. From the account that was published in the Chronicle it would appear that Crane's demeanor diffused at least some of the criticisms levelled against his theory. The thrust of Crane's defense of "simple heat" was a comparison of Dublin and Leicester. The MOH said that Dublin's diarrhoea mortality, far lower than Leicester's, was due to the Irish town's cooler temperatures. Crane emphasized that Dublin was a much larger town, had a sewage system that was worse than Leicester's, but averaged about 4 or 5 degrees Fahrenheit lower than Leicester in the summer. He went on to predict that his next annual report would prove that "simple heat" was fact not theory. In reference to Barfoot's sanitation sarcasm, Crane stated his belief that sewerage improvements should still be a goal for the borough because there was a connection between drainage and "fever" even though there was no connection between drainage and diarrhoea.

Barfoot offered more rational criticism of "simple heat." Temperatures within Leicester would have had little variation but diarrhoea mortality varied by wards within the

³⁰ Ibid.

³¹ Ibid.

town. Using the MOH's own statistics from 1870 Barfoot showed that the variation ranged from 1 death in All Saints' ward to 90 deaths in Middle St. Margaret's ward. Crane countered this meteorologically by contending that cooling breezes acted favorably on high ground and where relatively few buildings existed to block the flow of the wind. All of St.Margaret's was on low ground and Middle St Margaret's was surrounded by urban development.

Councillors C.R. Crossley and Dr. G. Pierce rose in part to defend Crane and in part to further the non-meteorological dialogue of the "disease." Dr. Pierce "did not think that Dr. Crane meant that heat was directly the cause of diarrhoea; but it certainly did cause a great increase in fermentation."³² It sounds as though Pierce did not want to believe Crane's unequivocal pronouncements of his position. Pierce went on to posit that "[t]he increased temperature had a great effect upon milk, and where, as was now the practice, infants were fed so much from the bottle, they were likely to get sour milk, and in that way diarrhoea."³³ Pierce's "milk theory" was one which would gain currency among Victorians but there would be several different explanations advanced for the dangers caused by milk. Pierce also suggested that Barfoot convene "a meeting of medical men to discuss that important question."³⁴

Crossley argued that heat was undoubtedly involved in diarrhoea mortality but that it was wrong for investigators to expect to attribute the "disease" to only one cause: He recommended that mortality statistics be compiled more narrowly than by wards. He also brought soil composition into the debate; noting that Middle St.Margaret's had a fairly large amount of open space, Crossley introduced the "made ground theory." Areas such as Middle St.Margaret's were located where clay pits or quarries had been worked in times

³² Ibid. Dr. Pierce's name is sometimes spelled Pearce but Pierce occurs more frequently.

³³ Ibid.

³⁴ Ibid.

past. The pits were surrounded on the sides and bottom by unharvested clay which allowed for precious little natural drainage. All types of garbage had been dumped into the pits, including dead animals, and then buildings had been erected on top of this. It was Crossley's belief that the garbage (or "made ground") decayed, was trapped by the clay, and released toxins upward by evaporation in hot weather. He contrasted the mortality in this ward with a ward that was built on soil with much natural gravel. In the ward built on gravel cesspools had always been self-draining and there were few diarrhoea deaths.

In the wake of the 1871 town council debate there was no new activity by the borough, not even the meeting of medical men that Pierce had advocated. Crane's annual report for 1871 can not realistically be considered to have proven the "simple heat theory" and he tended to emphasize the poor "vigour of the infantile population" more often.³⁵ Historian Barbara Thompson finds that Crane was not alone among medical men in this perception. In 1873 a Dr. Bridges, onetime physician to the Bradford Infirmary and later Medical Inspector of the Local Government Board, wrote that the population was "damaged at or before birth by the factory system."³⁶ However Thompson notes, "by the 1870s the emphasis in explanations of causation had gradually shifted from working mothers to the home environment."³⁷ Elements of both sorts of explanations, as well as others, can be seen in 1870s Leicester.

MOH Crane eventually took Crossley's advice and in 1873 sent the local nuisance inspectors, Sergeants Buxton and Brayley, to conduct a survey of the homes of infant victims. I label this seminal study as Crane's "paradox enquiry." The inspectors were able

³⁵ LRO 20 D 72/2, J. Wyatt Crane, *MOH 1871*, 19-20. Crane argued that the 'infantile population' was "still undergoing a marked and progressive deterioration."

³⁶ Barbara Thompson, "Infant Mortality in Nineteenth-Century Bradford," in *Urban Disease and Mortality in Nineteenth-Century England*, eds. Robert Woods and John Woodward (London: Batsford Academic and Educational, 1984), 129.

³⁷ *Ibid.*

to obtain information regarding 283³⁸ of the 314 deaths in 1873.³⁹ "Simple heat theory" was thoroughly vindicated in this enquiry, not because it was proved in a positive sense but because all other theories seemed to be disproved. Little remains of Crane's data but on no less than five counts his conclusions earn the label of "paradox enquiry": houses with good air circulation were more deadly than confined houses, clean homes were more fatal than average or dirty homes, houses with piped water were more dangerous than those which relied upon wells, mothers who did not work outside the home lost more children than those who did, and breast-fed infants died with greater frequency than did bottle-fed infants or infants fed by a combination of breast and bottle.⁴⁰ The Lancet considered Crane's "paradox enquiry" to be "at variance with professional theories."⁴¹ Yet "professional theories" had proved no more effectual at retarding diarrhoea than had "simple heat theory" in the 1870s.

Another enquiry of 1873, presumably impressionistic, was offered by Joseph Dare from conversations with an unnamed "medical gentleman" of twenty years experience.⁴² It is possible that this effort was meant to compete with the "paradox enquiry" because it also offered five points of explanation. According to Dare's source diarrhoea mortality arose from: early marriages that produced "poor, weakly, sickly, fragile things,"⁴³ poor nursing care afforded by old women and young girls in lieu of working mothers, feeding problems from unclean bottles and water mixtures that contained arrowroot or flour, preventives and remedies that contained metals or opium, and dirty or poorly ventilated houses.⁴⁴ Dare's

³⁸ LRO 20 D 72/60, W. Elgar Buck and George Cooper Franklin, Report on the Epidemic Diarrhoea of 1875, (Leicester: Spencer Brothers and Russell, [1875]), 5-6. [hereafter Buck-Franklin, Report].

³⁹ LRO 20 D 72/2, J. Wyatt Crane, MOH 1873, 7.

⁴⁰ *Ibid.*, 7-8. In 1871 28% of Leicester's married women worked outside the home. Nancy Grey Osterud, "Gender Divisions and the Organization of Work in the Leicester Hosiery Industry," in Unequal Opportunities: Women's Employment in England 1800-1918, ed. Angela V. John (Oxford: Basil Blackwell, 1986), 58.

⁴¹ Lancet, 27 June 1874, 908.

⁴² Joseph Dare (1873), quoted in Haynes, Working-Class Life, 49.

⁴³ *Ibid.*

⁴⁴ *Ibid.*

exposition, continuing the tradition established by Edwin Chadwick of marshalling evidence to support an agenda, was intended to support the notion that local boards should have the power to raze slums in pursuit of public health.⁴⁵

In 1874 Crane believed that he was on top of the game. His annual report for that year proclaimed "[t]hat it is heat which gives rise to summer diarrhoea is, I believe, now almost generally acknowledged. The Society of Medical Officers of Health, in London, met last year to consider the question, and [their] verdict was, I believe, almost unanimous in the affirmative."⁴⁶ Crane, feeling vindicated and secure, pontificated: "[t]he inhabitants of the factory towns...owe their debility to the gradual degeneration of themselves, and their forefathers and mothers by a factory life, until a race is generated which is so debile as to be unable to resist the first shock of disease."⁴⁷ Their children "were in fact born dying, and no carefully selected diet or medical skill could avert the inevitable result."⁴⁸ The only attack on Crane's theory from within Leicester in 1874 came from a new member of the town council/Local Board, Mr. Richardson, who advocated a variation of "milk theory" by making the rather absurd claim that all infant mortality "was entirely owing to the dilution of milk with water."⁴⁹ While Richardson's assertion was absurd it implied a correctable situation as opposed to Crane's fatalism.

Three factors contributed to make 1875 an important year for Leicester and the diarrhoea question: recognition that "infantile mortality...has now unhappily become chronic in Leicester,"⁵⁰ increased pressure from the medical profession, and the flood of 1875 which created fears of epidemic. Deaths from the "disease" were high in 1875,

⁴⁵ Ibid., 55.

⁴⁶ LRO L.614, J.Wyatt Crane, MOH 1874, 5.

⁴⁷ Ibid., 8.

⁴⁸ Ibid., 5.

⁴⁹ LC, 7 March 1874.

⁵⁰ Ibid., 17 July 1875.

reaching 308, but this figure was by no means unprecedented.⁵¹ Moreover the level of concern about diarrhoea, shown by press references in the spring and early summer, was rising before the traditional season of high mortality. To an extent concern was rising because actual deaths were occurring but it would be wrong to conceive of this concern as a straightforward and rational reaction to current conditions.

By 1875 there was a clear pattern of unusually high diarrhoea mortality in Leicester relative to other towns. Week after week and year after year the Registrar-General listed the town at or near the top of the kingdom in infant mortality and the "excess" of mortality was due almost exclusively to diarrhoea. Constant repetition of comparative statistics was not lost on the Leicester Chronicle and made the Lancet focus its attention on the town. The Lancet might not have taken a different editorial viewpoint without Crane's "simple heat theory" but the MOH made sure that Leicester became a target rather than just a topic for the journal.

That the Lancet motivated Leicester's leaders toward action on diarrhoea mortality is hardly questionable. The contemporary chairman of the town council's Sanitary Committee, Councillor Grimsley, acknowledged "public attention having been called to this matter by the medium of the Lancet."⁵² Thomas Windley, who would become the Sanitary Committee's chairman for thirty years, said in 1875 that he moved for a subcommittee to investigate diarrhoea because of what he had read in the Lancet.⁵³ While the chronic appearance of the "disease" and its publicity in the Lancet motivated intensive investigation into the problem, it was the flood of 1875 that pushed concern to a new level.

⁵¹ LRO L.614, J.Wyatt Crane, MOH 1875, 10. Raw mortality from diarrhoea had been above 300 in four previous years: 1868-349, 1871-303, 1872-305, and 1873-314.

⁵² LC, 4 September 1875.

⁵³ Ibid.

Before the flood the Chronicle reported on impure milk samples, the national Factory and Workshops Commission's report, Crane's rebuttal to that report, and the creeping diarrhoea death toll in Leicester. The purity of retail cow's milk was analyzed by Dr. Meadows along with other types of consumables. In his position as Leicester's public analyst Meadows tested products from flour to beer. Of the milk samples submitted to Dr. Meadows nearly 65% were found to be impure for unspecified reasons; among other products only bread (7%) contained any impurities.⁵⁴ Regarding the Factory and Workshops Commission's report the Chronicle summarized the findings as contrary to Crane's supposition that factory work led to debility.⁵⁵ Crane responded in the next issue of the newspaper by claiming that he had been misunderstood. The MOH said that by "factory life" he did not mean factory work per se but the lifestyle associated with working mothers.⁵⁶ The Chronicle did not bother to attack this clear contradiction of the fourth tenet of Crane's own "paradox enquiry" but noted sadly the imminent return of the annual mortality.⁵⁷

After the July flood both dialogue and activity increased in Leicester. As mentioned above the Chronicle predicted that disease would be epidemic in the wake of the flood. Moreover A. Buchan's "The Mortality of the large towns of the British Isles in relation to weather" appeared and refuted "simple heat theory" by a comparison of temperature and mortality between Bristol and Leicester.⁵⁸ But the most significant occurrence in post-flood Leicester was the commissioning of the Buck-Franklin investigation.

⁵⁴ Ibid., 3 July 1875.

⁵⁵ Ibid., 10 July 1875.

⁵⁶ Ibid., 17 July 1875.

⁵⁷ Ibid.

⁵⁸ Ibid., 14 August 1875. It appears as though Buchan's analysis was not greatly more sophisticated than Crane's comparison of Leicester and Dublin but I have only seen a summary and not the entire report.

The Buck-Franklin investigation emerged from within Windley's diarrhoea subcommittee of the council's Sanitary Committee in August 1875. The field work was well underway by the time the entire council discussed the merits of such a study in the first week of September and publicity preceded the discussion.⁵⁹ Councillors Windley, Grimsley, and Richardson all told the council about the perceived pressure from the Lancet to take some action with regard to diarrhoea.⁶⁰ Richardson also spoke of the medical profession's dim view of Crane's "simple heat" explanation. Grimsley complained of "certain writers" who censured the town "in a way [it] did not deserve." The chairman spoke defensively about Leicester's mortality rate and stated that diarrhoea did not arise from unsanitary conditions in the town. In his opinion the Buck-Franklin investigation might exonerate the borough's sanitary authorities and thus "efface the blot from their otherwise fair escutcheon." Windley added that he thought it unlikely that Buck and Franklin would successfully determine the cause of diarrhoea.

Grimsley told the council that the subcommittee had first approached Crane to conduct the investigation but the doctor was too busy with his MOH duties and his private practice.⁶¹ Richardson said that Leicester's MOH also believed that there was nothing of value to be gained from another study of the problem. Aldermen Stevenson and Winterton both spoke in support of the Buck-Franklin investigation with Winterton adding that £10 was too cheap to pay for an important matter such as this. Windley replied that on the odd

⁵⁹ Lancet, 21 August 1875, 291; LC 14 August 1875 and 21 August 1875.

⁶⁰ The following comments by council members were reported in the LC, 4 September 1875 until otherwise noted.

⁶¹ It is an interesting point that the MOH position remained part-time in Leicester until 1885 when Dr. Henry Tomkins took the position for £500 per annum. Despite Leicester's early employment of an MOH some observers considered the town to be rather miserly in its remuneration for the job. See Alexander P. Stewart's comments in Alexander P. Stewart and Edward Jenkins, The Medical and Legal Aspects of Sanitary Reform (London: Robert Hardwicke, 1867; reprint with an introduction by M.W. Flinn, Leicester: Leicester University Press, 1969), 42. At the time Stewart was writing John Moore was receiving £100 per annum, by 1874 Crane was receiving £200 per annum and had been turned down for a raise to £250. When Crane was replaced by William Johnston the salary was set at £250 until Tomkins took the job with increased responsibilities.

chance that Buck and Franklin were successful they would be paid in fame rather than pounds sterling. The council's discussion of the fait accompli was punctuated with the mayor's derogation that if Major Tulloch could find the time to travel from London to meet with the subcommittee then surely Dr. Crane should be able to attend but he had not done so.

To the historian, the report which Dr. W. Elgar Buck and Mr. George Cooper Franklin compiled is worth far more than the £26 5s. that each of the gentlemen were ultimately paid for it. The statistical data alone provides a demographic picture of the "disease" that outweighs their not insignificant conclusions. Extensive exposition of the report is warranted in this paper. The essence of Leicester's problem was that the town was generally not unhealthy; overall mortality was 24.1 per 1000 living compared with 25 per 1,000 for the 18 largest towns in Britain. But 36.5% of all deaths in Leicester were of children under one year of age compared with 26.3% in the 18 towns. Specifically diarrhoea deaths in Leicester amounted to 8.5 per 1,000 living, more than twice the national urban mean of 3.8 per 1,000. Moreover well over 1 child in 5 in Leicester did not live to see their first birthday.⁶² The investigators made house to house inquiries of all homes which suffered a reported diarrhoea fatality of a child under five years of age between 1 July 1875 and 30 September 1875. Of 238 such cases, Buck and Franklin were able to report on 216.⁶³

Of the 216 deaths, 86% or 186 were under one year of age (in Crane's "paradox enquiry" 95% had been less than one year old).⁶⁴ Before they succumbed 42.6% suffered for one week or less, 27.8% from 1 to 2 weeks, 9.3% from 2 to 3 weeks, and 20.4% for

⁶² LRO 20 D 72/60, Buck-Franklin, Report, 35.

⁶³ *Ibid.*, 5. Of the 22 cases that could not be included: 11 families had moved away, 8 of the children were illegitimate (rendering family data "useless"), 1 mother had since died, and 2 cases were considered to have been misdiagnosed as diarrhoea.

⁶⁴ *Ibid.*, 5-15 until noted.

longer than 3 weeks. The average age of the father was 30.8 years and the mother 29.9 years. Fifty-three of the mothers (24.5% compared with the "paradox enquiry"s" 28.9%) worked outside the home, 24 or 11.1% worked for wages within the home, and 139 or 64.4% did not work for wages at all. Only 22 or 10.1% of the victims had been exclusively breast-fed, while 133 or 61.6% were partially breast-fed, and 61 or 28.2% had never suckled from the breast. Of particular note is that only 3 or 4 of this last group were fed cow's milk exclusively. Another tantalizing statistic is that 39% of the victims' mothers were "in the habit" of using opium laced cordials for their children but it is unclear exactly what "in the habit" means.

There was no such ambiguity in "that all these infants who died were those whose parents belonged to the so-called working classes; so it would seem that those infants whose parents were of the middle or upper class, did not suffer equally with those of the lower. They suffer to some extent of course, but the disease is not fatal among them."⁶⁵ Buck and Franklin could not reconcile this observation with the "simple heat theory." Moreover Buck and Franklin were forced to reject the opinions of the victims' own mothers because "[if] we had taken the explanations of the mothers, we might return 80 per cent of these fatal cases as having been due entirely, or in greater part, to teething."⁶⁶ A third theory that Buck and Franklin were forced to reject was general uncleanness of the victims' homes; mortality could not be correlated with individual families' hygienic practices regardless of their impressionistic relation to poverty.⁶⁷ A fourth idea that was discredited was the "working mother theory" In their own words:

We wish to draw particular attention to this: That 24.5 per cent. of nursing mothers [this would be potentially nursing mothers] go out to work is a fact

⁶⁵ Ibid., 28.

⁶⁶ Ibid., 18.

⁶⁷ Ibid., 28.

much at variance with current opinion. It is stated often that anyone can tell how it is that the infants die, 'that their mothers go out to work, and that the infant does not receive proper food and attention'....We here do not hesitate to state our opinion that the nursing mothers do not, as a rule, neglect their children.⁶⁸

In addition to the assertion that diarrhoea mortality was a function of class Buck and Franklin observed that "[g]enerally speaking the distribution of the disease is determined by the course of the river. The higher parts of the town have but little."⁶⁹ They went on to a geological/ geographical explanation that supported the "made ground theory." Middle St.Margaret's ward was still the most fatal part of town with its clay perimeters and its "landfill" soil composition. If the entire Buck-Franklin report could be reduced to one statement with regard to causation it might be: mortality from diarrhoea was highest where the subsoil was saturated from stagnated sewage or where "made ground" filled the clay pits that could not be drained.⁷⁰

Buck and Franklin went on to write of their belief that there was more than one malady involved in diarrhoea. They described three types of the "disease." First diarrhoea could be merely a symptom of another disease. Second diarrhoea could be a "sequel" to another disease, that is some other disease could run its course but leave the child in such a weakened state that he or she would be very susceptible to diarrhoea. Third "which is of the greatest importance...with regard to the present enquiry" was a condition that they termed "specific diarrhoea."⁷¹ Specific diarrhoea was deemed to be present in those cases in which the child had relatively healthy parents, had been healthy herself prior to the attack, and died within one week of the onset of symptoms.⁷² Four conditions were considered to contribute

⁶⁸ Ibid., 9.

⁶⁹ Ibid., 38.

⁷⁰ Ibid., 44.

⁷¹ Ibid., 16-17.

⁷² Ibid., 26.

to specific diarrhoea: decomposing organic material, heat, air, and moisture. Quoting a Dr. Parkes, Buck and Franklin wrote that "probably they [the agents of disease] are low forms of life which grow and propagate in these conditions."⁷³ The investigators lamented public resistance to postmortem examinations which they believed would shed more light on the organisms involved.⁷⁴

Reaction to the Buck-Franklin report was something of a mixed bag but it would seem that no writers really changed their minds in the wake of its publication. The Chronicle blamed the sewage system for the problem before Buck-Franklin and argued that without "sewerage reform, more additional 'reporting' cannot but be regarded as less than useless."⁷⁵ It did not change its focus after the report. Joseph Dare wrote that he concurred with Buck and Franklin yet maintained that "[o]ne great cause, if not the chief cause, will be found in the vice and immorality, the drink, bad food, and irregular habits of numbers of the human family."⁷⁶ Dr. Crane, not surprisingly, disparaged all aspects of the report from saturated subsoil to specific diarrhoea. Claiming support from Chairman Grimsley he reiterated "simple heat theory" with special attention to the lack of cooling breezes in the low-lying, high mortality districts.⁷⁷

The Lancet reported a host of likely contributing causes from maternal neglect to narcotics but recognized that these problems, unlike drainage, were not unique to Leicester. The journal tentatively accepted Buck-Franklin's conclusions but recognized that the report did not attempt to identify a specific organism responsible for specific diarrhoea.⁷⁸ About six months later the Lancet was more enthusiastic in its support of the report because

⁷³ Ibid., 45.

⁷⁴ Ibid.

⁷⁵ LC, 14 August 1875.

⁷⁶ Joseph Dare (1876), quoted in Haynes, Working-Class Life, 50.

⁷⁷ LRO L.614, J. Wyatt Crane, MOH 1875, 6-8.

⁷⁸ Lancet, 29 January 1876, 183.

Leicester appeared to be "in remission" from diarrhoea deaths relative to the previous year. While the journal gave credit to Buck and Franklin's work on saturated subsoil it contended that, since no improvement could have been made on that account, the house-to-house investigation had proved to be a preventive measure by educating parents. "Much of the excessive infant mortality among the working classes is directly due to the ignorance and neglect of parents, and the apparent result of the recent Leicester inquiry very forcibly suggests that much good might result from more frequent investigations."⁷⁹ When diarrhoea mortality in Leicester rebounded the following month the Lancet made no mention of Buck and Franklin or their conclusions.⁸⁰

One member of Leicester's Sanitary Committee, Dr. John Sloane, decided to launch his own investigation of diarrhoea in 1876. Sloane seized upon the Buck-Franklin statistics to support his own hybrid of "sewage theory" and "milk theory." He attacked Crane's "simple heat" with a crude comparison of average third quarter, or July to September, temperatures and mortality.⁸¹ He attacked Crane's attendant notion of factory life debility without recourse to evidence: "I do not think the people in Leicester are physically degenerating."⁸² Sloane decided that Leicester's infant diarrhoea mortality was most likely caused by children drinking milk which had come from cows that grazed on land that was contaminated by its proximity to the sewage laden River Soar.⁸³ It would seem that Sloane wanted to believe this explanation rather than being empirically convinced of its veracity. Buck and Franklin had indeed shown that exclusively breast-fed children had low mortality but they had not shown that cow's milk was dangerous at its source by any stretch of the imagination since exclusively milk-fed babies comprised less than 2% of

⁷⁹ Ibid., 15 July 1876, 95.

⁸⁰ Ibid., 26 August 1876, 304-05.

⁸¹ LRO Pamphlets vol. 63, John Sloane, Report on the Infantile Diarrhoea of Leicester [1876], 9.

⁸² Ibid., 31.

⁸³ Ibid., 33.

fatalities in their study. Sloane merely associated infant mortality with his impression that infants were heavy consumers of milk. He did not refer to Dr. Meadows' analyses which, in their published form, did not distinguish between milk samples that were impure because of adulteration and those that were impure because of spoilage. On a more useful note Sloane advocated that the nuisance inspectors, Sergeants Buxton and Brayley, assess the milk consumption of diarrhoea victims in the future.⁸⁴

While the aging Dr. Crane began to lose interest in diarrhoea and the controversy which surrounded the problem a youthful Dr. William Johnston represented new blood in Leicester's concern to resolve the problem.⁸⁵ New to Leicester in the mid-1870s the Ulster-born Johnston would become Crane's assistant in 1877 and his successor by 1880. Although Johnston's fame would come primarily from the "Leicester Method" of smallpox containment he was a vociferous critic of the sewerage system and its relationship to diarrhoea mortality even before he was in a position to effect any changes in the town's response to smallpox.⁸⁶ His initial foray into the diarrhoea debate criticized "made ground theory" and attacked the sewer system.⁸⁷

Johnston's classic "Report on the Principal Zymotic Diseases during 1877" was the doctor's first project on becoming Leicester's assistant MOH. Presented to the Sanitary Committee of the town council on 18 January 1878 this document spelled out the

⁸⁴ Ibid.

⁸⁵ For Crane's flagging interest see the Lancet, 27 April 1878, 618. For brief biographical information on Johnston see Stuart M.F. Fraser, Leicester and Smallpox: The Leicester Method, Medical History 24 (1980): 317-18 and especially note 15.

⁸⁶ Perhaps I use the word "fame" a bit loosely. Despite the fact that Dr. Johnston unintentionally became a hero to the anti-vaccination movement his name is almost universally misspelled, from contemporaries such as the Lancet (with the odd exceptions of August 1878 and June 1885) to historians such as Bill Lancaster, Radicalism, Cooperation and Socialism: Leicester Working-Class Politics 1860-1906 (Leicester: Leicester University Press, 1987), 82 and Dale-L. Ross, "Leicester and the Anti-Vaccination Movement, 1853-89," Transactions of the Leicestershire Archaeological and Historical Society 43 (1967-68): 35-44. Moreover Anne Hardy, The Epidemic Streets, 124 believes that Johnston's smallpox strategy was not original.

⁸⁷ Lancet 7 October 1876, 516.

"Leicester Method," advocated low cost day care for children of working mothers, and provided a reasonable breakdown of causation of diarrhoea mortality. Sensing the complexity of diarrhoea Johnston assigned 1/3 of the blame to improper feeding of children. Rather than attack the intelligence of working class parents as Winterton did in 1875,⁸⁸ or the debility associated with factory life as did Crane, Johnston claimed that it was not reasonable to criticize parents simply because the mother had to work outside the home to support the family. Though he thought it regrettable he understood that such labor was necessary and posited that the remedy was in "Creches or public Nurseries."⁸⁹ At the heart of Johnston's problem with mothers who could ill afford to breast-feed was the reliance upon arrowroot and water formulas. Should there be made available "fresh unadulterated cow's milk" in creches with trained attendants, offered at minimal expense, diarrhoea mortality should surely decrease.⁹⁰

Johnston placed responsibility for the remaining 2/3 of diarrhoea mortality squarely on the shoulders of the sewer system. His opposition to Buck-Franklin on this account appeared greater at the time of his study than it does today. While Johnston disagreed with "made ground theory" he described conditions that posed the same hazards: organic material, heat, and moisture (air was left out).⁹¹ The "Zymotic Report" shows historians that germ theory was increasing in practical acceptance because decomposing organic materials were not assumed to be the culprits per se, rather it was infected organic material coming into contact with people that caused the "disease." But Buck-Franklin and the "Zymotic Report" shared the condemnation of poor drainage. Whatever organisms were living in stagnant sewage managed to make their way back to the working class citizens of

⁸⁸ LC, 4 September 1875.

⁸⁹ LRO L.614, William Johnston, A Report on the Principal Zymotic Diseases During 1877 (Leicester: J.Fleming & Co., [1878]), 18.

⁹⁰ Ibid., 17.

⁹¹ Ibid., 19-53.

Leicester. To Buck and Franklin they were non-specific "low forms of life" but to Johnston they were bacilli (Johnston made no distinction between bacteria as a general category and bacilli as the rod-shaped members of that category) capable of becoming airborne in sewer gas. Johnston's appreciation of bacteria as an agent of disease demonstrates an increasing sophistication in Leicester's approach to diarrhoea specifically and germ theory generally but it was also indicative of the times that he looked to microbiology to find one particular bacillus, similar to typhoid, that would prove to be the agent of the "disease."

The Chronicle was immediately enamored with Johnston, presumably because his conclusions indicted the sewage system that the editors disparaged so stridently. The newspaper gave extensive coverage to the "Zymotic Report" in its issue of 30 March 1878 without once mentioning the doctor's method of smallpox containment. Referring to Johnston's diarrhoea investigation the newspaper chose terms such as "courageous" and "exhaustive" as it praised the doctor's "scientific skill...indefatigable industry and perseverance."⁹² No doubt the new assistant MOH seemed quite impressive juxtaposed with Dr. Crane.

The Lancet was also taken with Dr. Johnston albeit not to the same extent as the Chronicle and with quite some delay. As the summer diarrhoea season began in 1878 the Lancet busily set about the annual bemoaning of Leicester's seemingly permanent position at the pinnacle of the Registrar-General's list of town mortality from the "disease." Indeed the journal considered that such attention had "lost its novelty" yet it remained "a duty [to] again and again...call attention to this preventable loss of infant life."⁹³ The Lancet refused to accept excuses such as "meteorological conditions" or "infant feeding" to explain the

⁹² LC, 30 March 1878.

⁹³ Lancet, 20 July 1878, 97. The journal compared statistics from 1870 to 1877 and found that Liverpool was higher in infant mortality (deaths per 1,000 births) than Leicester but that this was from a variety of causes rather than the almost uncausal mortality in Leicester.

problem because these were not "exceptionally vicious" in Leicester. The editors were emphatic that they did not wish to discourage efforts to improve infant feeding but Leicester's problem was "an exceptionally insanitary condition which imperatively calls for amendment."⁹⁴ So the journal was pleased with the "Zymotic Report" when it was finally addressed in the issue of 17 August: pleased with Johnston's correlation of disease with sewerage deficiencies but also cautious because "Dr. Johnston's results have not been accepted unreservedly by the sanitary authority."⁹⁵ As we have seen, the "sanitary authority" of Leicester inclined away from expensive remedial measures during this period. Nonetheless two examples show that there was at least some concern among the more well-to-do citizens in Leicester about the plight of working class infants. First, evidence exists of a creche that was opened in response to Johnston's recommendation. According to an anonymous corporation source the creche opened on Metcalf Street in June of 1878 funded by £197 of charitable contributions.⁹⁶ While independent corroboration of the opening of the Metcalf Street creche is difficult, it was claimed that during 1879 the creche served 20 children daily and that both parents of these children had to work outside the home or, in the case of widows, the mother had to work outside the home.⁹⁷ Second, in 1879 the Sanitary Committee began to make available an anti-diarrhoea "mixture" for use as a remedy at no cost to the consumers.

In 1880 the diarrhoea mixture was again made available free to the public from 31 July to 29 September. During this particularly fatal year there were 8,284 persons treated

⁹⁴ Ibid., 27 July 1878, 130-31.

⁹⁵ Ibid., 17 August 1878, 228-29.

⁹⁶ LRO 20 D 72/56, City of Leicester, Notes on Annual Reports of Medical Officers of Health, 1854-1900, 9. [hereafter Notes on MOH].

⁹⁷ Ibid., 9-10. The problem with corroboration arises with the Leicester Chronicle of 21 August 1880. The newspaper announced the opening of this creche at that time and cites Dr. Johnston's approval of such a measure. The details from Notes on MOH suggest independent knowledge: the name of St. Luke's Day Nursery, the rules, the philanthropic subscription, and the attendance figures for 1879. In the long run exactly when the creche opened is of less importance than the fact that it opened as a response to Johnston's plea and that it was a charitable venture rather than a form of municipal socialism.

with the mixture and 346 deaths from diarrhoea during the period of its distribution. Table 3.1 shows the ages of the recipients of the mixture and the ages of diarrhoea victims during the third quarter of 1880. Johnston's data does not attempt to link the deceased with use of the mixture so inferences on the efficacy of the mixture would be unwarranted but certain demographic information is revealed. Johnston's data on the number supplied shows that infantile diarrhoea struck all ages of the population even though mortality, shown just as clearly, was quite age-specific. In 1880 something near 7% of the entire population availed itself of the diarrhoea mixture. Some 36% of the recipients were under the age of five, the group with fully 98% of the mortality. However only 6% of the recipients were children under one, the group in which 70.5% of the deaths occurred. Still the data shows that a great many parents attempted to treat their children's "disease" via this civic program and it can be assumed that others received some treatment by private practitioners. The Sanitary Committee continued its program of mixture distribution "in the poorer districts of the town" until 1891 with more than 10,000 persons receiving the treatment in at least one year, 1884.⁹⁸

The year 1880 would record Leicester's highest numerical level of diarrhoea deaths in the period under study but the season of mortality occurred rather later in the year than usual. As late as 14 August the Chronicle had high hopes for the children in this year. So constant had been the association between diarrhoea fatality and the town that in its review of the Registrar-General's weekly report the Chronicle considered it newsworthy to print: "Leicester is not mentioned in connection with this disease."⁹⁹ But any celebration would have proved premature for by the end of the month deaths in the town were

⁹⁸ LRO 20 D 72/4, William Johnston, MOH 1880, unpaginated insert between pages 38 and 39; LRO 20 D 72/5, Henry Tomkins, MOH 1887, 17; LRO 20 D 72/5, Henry Tomkins, MOH 1889, 18; LRO 20 D 72/5, Henry Tomkins, MOH 1890, 18. For the discontinuation of the distribution see LRO 20 D 72/5, Henry Tomkins, MOH 1891, 30.

⁹⁹ LC, 14 August 1880.

Table 3.1

Mixture distribution, 31 July to 29 September 1880, and diarrhoea deaths, 1 July to 30 September 1880

Age	<1	1-2	2-3	3-4	4-5	5-10	10-15	15-20
#Supplied	486	761	763	553	411	1076	645	397
#Deaths	244	76	14	4	1	1	0	0

Age	20-25	25-35	35-45	45-55	55-65	65-75	75-85	85<
#Supplied	368	796	899	515	352	187	70	5
#Deaths	0	0	0	0	1	2	2	1

Source: LRO 20 D 72/4, William Johnston, MOH 1880, unpaginated insert between pages 38-39.

strikingly high.¹⁰⁰ As September began "Leicester has once more regained its unenviable place" at the top of the Registrar-General's list.¹⁰¹ The Chronicle began to lose some of its zeal for the "old, old story."¹⁰² In a fatalistic tone the newspaper wrote "[a]s for the origin of the periodic visitation, where doctors still differ, it would be useless for the unprofessional student to attempt to decide."¹⁰³ The Lancet was equally exasperated with "this annual sacrifice of infant life in Leicester" but pleaded "[i]t should not surely be impossible to discover why infant mortality in Leicester is so high."¹⁰⁴

¹⁰⁰ Lancet, 28 August 1880, 353. For the month of June there were only 2 diarrhoea deaths, in all of July there were 25, in the first week of August the figure was 19, for the second week 26, and for the third week 50.

¹⁰¹ LC, 11 September 1880.

¹⁰² *Ibid.*

¹⁰³ *Ibid.*

¹⁰⁴ Lancet, 16 October 1880, 632-33.

Johnston's report for 1880 could not provide a simple solution to the problem. Still citing the sewerage problems in the town he blamed ignorance and neglect of mothers for deaths that could not be explained by the "fungoid impurities" in sewer gas.¹⁰⁵ But Johnston was able to point to two noteworthy features of 1880: first the summer of such dire mortality had been a relatively cool one and second that all ages of Leicester's population had suffered bouts of diarrhoea.¹⁰⁶ So another nail was placed in the coffin of "simple heat theory" by temperature comparison but Johnston was not trying to resurrect the specter of "weakly children" by his age comparison. The age specificity contained in Johnston's report was meant to show that fatalities alone did not reveal the prevalence of the "disease."

In 1881 when diarrhoea deaths in Leicester dropped to a raw figure of 193 there was some relief expressed in the town.¹⁰⁷ Yet this feeling did not spread to those watchdogs of national public health, the Registrar-General and the medical press, because 1881 was a light year for such mortality throughout the kingdom. The death toll in Leicester remained proportionately high such that the Lancet reported the

annual death-rate from diarrhoea in the twenty large English towns...averaged 2.8 per 1000 [living of all ages]. Whereas however, the rate of this fatality did not exceed 0.7 in Plymouth, 0.9 in Bradford, and 1.1 both in Oldham and Bristol, it ranged upwards in the other towns to 3.4 in Hull, 4.0 in Leeds, 4.3 in Nottingham, and was no less than 6.8 in Leicester. The excess of diarrhoea fatality in Leicester is of annual occurrence, but the proportion of this excess is larger than ever this year.¹⁰⁸

¹⁰⁵ LRO 20 D 72/4, William Johnston, MOH 1880, 46, 37.

¹⁰⁶ *Ibid.*, 33, 37.

¹⁰⁷ LRO 20 D 72/4, William Johnston, MOH 1881, 16.

¹⁰⁸ Lancet, 24 September 1881, 566.

Implicit in these statistics is a rebuttal of the factory life component of "simple heat theory" because of the relative health of towns such as Bradford and Oldham. As in the case of the sewage system, by the 1880s the Local Government Board had heard enough complaints to launch their own investigation. During the 1881 diarrhoea season the LGB commissioned Dr. Ballard and Mr. Power to get to the bottom of the problem.¹⁰⁹

Ballard and Power were unable to provide any kind of quick fix to the diarrhoea problem a la Major Tulloch and the sewerage problem in 1884. The reason for this was that no accepted remedy had developed on the prevention of diarrhoea in the way that sewage irrigation had come to be a well accepted solution for town drainage. It would take Ballard (Power was no longer in the project) eight years to produce a 130 page report that the doctor himself considered provisional and subject to retraction or modification.¹¹⁰ The length of time involved in the Ballard project, besides recommending his industriousness, indicates the complexity of the problem much as his equivocation on the conclusions indicates its mysterious nature. Nonetheless it was hoped in Leicester that Ballard would uncover a panacea.

Citing Dr. Ballard's investigation during several years of low or moderate death rates provided Leicester with a brief respite from internal pressure to new activity. Johnston's 1882 and 1883 annual reports did little more than give mortality statistics and mention Ballard's ongoing study.¹¹¹ But the Registrar-General's statistics took no holiday. In the midst of the particularly cool summer of 1882 the town was more than three times as fatal as the national average for large towns and the Lancet was as vocal as ever in calling attention to the situation.¹¹²

¹⁰⁹ Ibid. Also LRO 20 D 72/4, William Johnston, MOH 1881, 16.

¹¹⁰ LRO 20 D 72/5, Henry Tomkins, MOH 1882, 23.

¹¹¹ LRO 20 D 72/4, William Johnston, MOH 1882, 32; LRO 20 D 72/4, William Johnston, MOH 1883, 39.

¹¹² Lancet, 22 July 1882, 113.

In 1884 the death toll again rose above 300 to 344, nearly 200 more fatalities than in the previous year. Dr. Johnston "hoped that some practical and unmistakable recommendations for the mitigation of the evil may be included in the exhaustive Report which Drs. Ballard and Power have been engaged upon for several years past."¹¹³ He also reiterated "sewer theory" with emphasis on the transfer of "living organic ferments" from sewers to subsoil to humans.¹¹⁴ He noted that of the retail cow's milk tested in 1884 only 6% of the samples were found to have impurities.¹¹⁵ But in an otherwise unambitious annual report Dr. Johnston provided the twelve step description of the course of the "disease" mentioned above.

The summer of 1885 brought the usual attention from the Registrar-General and the Lancet.¹¹⁶ The year also brought a new MOH to Leicester as Johnston left the post to devote more time to a successful private practice.¹¹⁷ Dr. Henry Tomkins, the first truly full time MOH in Leicester, brought renewed vigor to the problem although it reached only a moderate mortality level in his first year.¹¹⁸ While Leicester's diarrhoea mortality was twice the average of the large towns in 1885 it was not the most fatal town in that year, being surpassed in that capacity by Preston.¹¹⁹ Tomkins mentioned heat as an exciting cause of diarrhoea but his annual report was well received in the Lancet nonetheless.¹²⁰

¹¹³ LRO 20 D 72/4, William Johnston, MOH 1884, 39.

¹¹⁴ Lancet, 16 May 1885, 914.

¹¹⁵ LRO 20 D 72/4, William Johnston, MOH 1884, 48.

¹¹⁶ Lancet, 25 July 1885, 163.

¹¹⁷ There was some contention regarding the reason for Johnston's departure. Apparently the Leicester Advertiser claimed that Johnston left the post because of "bullying and hectoring" by the Sanitary Committee, Lancet, 13 June 1885, 1096. In a letter dated 17 June 1885, Thomas Windley, chairman of the Sanitary Committee, stated that Johnston himself had cited the growing demands of his private practice as the reason and the MOH said that he was grateful for the cooperation that he received from the committee while he held the post. Lancet, 27 June 1885, 1183.

¹¹⁸ Simmons, Past and Present, 11 would appear to be wrong about claiming that Crane was the first full-time MOH in Leicester. See also Elliott, Victorian Leicester, note 19 to chapter 5.

¹¹⁹ LRO 20 D 72/4, Henry Tomkins, MOH 1885, 53-55.

¹²⁰ Lancet, 28 August 1886, 420.

Dr. Tomkins' tenure as Leicester's MOH was challenged early on because of the "excellent work" of his predecessor.¹²¹ The new doctor from Manchester was warned that it would "not be an easy matter to follow Dr. Johnston."¹²² But starting in 1886 Tomkins made a most comprehensive study of the "disease" which included experimental as well as observational methodology. He explained that he believed that the population of Leicester had become numbed to the annual tragedy because of its incessant repetition. He dismissed many of the conclusions of the investigators who had preceded him but of Johnston's "fungoid impurities" he said "[i]t is more than probable that this statement will ultimately be proved."¹²³ To indicate the imprecision of previous studies and to educate his employers he added

Already grave suspicions had fallen upon some aerial contamination as being the probable cause. But sewer gas, effluvia, miasms, malaria, bad smells give us no real explanation, these terms are little better than cloaks for our ignorance. The Scientist of the present day demands something more tangible and real than this.¹²⁴

First Tomkins located a section of the town which he called the "Diarrhoea area" because it contained 33% of the population but 84% of the diarrhoea deaths in 1886. Predictably this area was low-lying and flat. He collected air samples from this area and compared them with samples from areas of higher elevation and lower death rates. Air from the diarrhoea area contained "various micro-cocci and bacilli" numbering between 2,000 and 7,000 per cubic meter while air above higher ground had between 60 and 900. Tomkins cultivated these organisms in a laboratory setting. He did postmortems on an

¹²¹ Ibid., 13 June 1885, 1096.

¹²² LC, 1 August 1885.

¹²³ LRO 20 D 72/4, Henry Tomkins, MOH 1886, 14.

¹²⁴ Ibid., 17.

unspecified number of victims of diarrhoea and found that some victims had these organisms in their spleens and kidneys but all victims had them in ulcerations or the mucous membranes of their intestines. Still unable to isolate individual culprits, Tomkins injected someone (himself?) with small cultivated doses from both air and postmortem sources. The result was that "I have been able to induce with certainty a sharp attack of Diarrhoea, lasting from twelve to twenty-four hours." The MOH realized that he did not have incontrovertible proof of the agent of disease but there were four positive assertions that he could make: first these organisms existed in vastly larger numbers where diarrhoea was prevalent than where it was not, second they were present in the bodies of the victims, third they could be shown to reproduce under laboratory conditions, and fourth the cultivated specimens caused diarrhoea. He further claimed that sewage would make an ideal medium for the organisms to procreate and the warmer the sewage the more the organisms would prosper.¹²⁵

In his next annual report Tomkins looked back at the history of the "disease." Because natural deaths were not tabulated by cause in Leicester until 1851 Tomkins looked for the traditional bulge in mortality during the third quarter of the years before diagnostic statistics were kept. What the MOH found remains as suggestive as it does ambiguous. Table 3.2 shows that from 1845 through 1850 "diarrhoea season" was not an especially fatal time of year; the traditional bulge in quarterly mortality statistics did not exist in the late 1840s. During those six years the third quarter was the most deadly on only one occasion and in 1849 it was the least deadly. This led Tomkins to posit that summer diarrhoea was significantly less virulent in Leicester's past. As Tomkins already subscribed to "sewer theory" generally this information reinforced his perception that the

¹²⁵ Ibid., 14-20. The quote is from page 18.

Table 3.2
All deaths by quarter 1845-1850

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1845	445	432	458	354
1846	342	305	436	460
1847	442	327	343	345
1848	353	379	353	401
1849	516	411	360	402
1850	351	302	367	393

Source: LRO 20 D 72/5, Henry Tomkins, MOH 1887, 22.

deficiencies of the Wicksteed sewer system could indeed be translated into the loss of human lives as the Chronicle had said some years before.¹²⁶ Yet Tomkins realized that this data was subject to another interpretation: that improvements in death rates from causes other than diarrhoea created the 3rd quarter bulge by reducing their totals in the other quarters. While the MOH believed that diarrhoea had worsened to create the 3rd quarter bulge he had to remain tentative on this point.¹²⁷

His adherence to "sewer theory" gave Tomkins an optimistic view about the future of diarrhoea in Leicester. The Gordon sewer system was the single most important remedy to Tomkins and construction of the system continued apace during his tenure. In the

¹²⁶ LC, 31 July 1875.

¹²⁷ LRO 20 D 72/5, Henry Tomkins, MOH 1887, 18-26.

meantime the Sanitary Committee made several attempts to stave off the "disease." In 1886 disinfectant was added to sewage in the low-lying districts with no apparent effects.¹²⁸ In 1887 water mixed with carbolic acid was sprayed on the streets of those districts and mortality did decrease. Tomkins was unable to make a direct connection between the spraying and improved mortality but the project was continued in 1888.¹²⁹ Milk analysis continued in a more efficient manner as it was placed under the auspices of the MOH. Purity infractions were treated more as health transgressions rather than commerce deceptions.¹³⁰

Tomkins continued his research for the next several years and was able to limit potential disease agents to a smaller group of "micro-cocci and small bacilli." Without intentionally commending pythogenic theory he acknowledged an extremely offensive smell that came from his cultivated microbes.¹³¹ He also tested a more sophisticated heat theory and found that diarrhoea season could be correlated with a sustained temperature of 60°F at a level of one foot underground.¹³² His continual experimentation, his conclusions, and his cooperation with Dr. Ballard won him considerable praise from the medical press.¹³³

Dr. Ballard's report finally appeared in April of 1889. Except some quite minor disagreements the three main causal factors that he found for diarrhoea agreed with Tomkins' assessment of the situation. The first causal factor was constantly damp soil that had contact with sewer or cesspool leakage. Loose or fine soil exacerbated the

¹²⁸ LRO 20 D 72/4, Henry Tomkins, MOH 1886, 21.

¹²⁹ LRO 20 D 72/5, Henry Tomkins, MOH 1887, 17-18.

¹³⁰ LRO 20 D 72/4, Henry Tomkins, MOH 1886, 76. The length and temperature of storage continued to be unregulated even after the permissive 1890 legislation. LRO 20 D 72/5, Henry Tomkins, MOH 1891, 42-48.

¹³¹ LRO 20 D 72/5, Henry Tomkins, MOH 1888, 25.

¹³² LRO 20 D 72/5, Henry Tomkins, MOH 1889, 20.

¹³³ Lancet, 6 August 1887, 284; 15 December 1888, 1202; 15 June 1889, 1199-1200.

transmission of micro-organisms that manufactured "virulent chemical poison[s]." Where Ballard and Tomkins disagreed was on the heat and depth of the soil that optimized the production of these organisms. Tomkins believed that the critical point was when the temperature at one foot maintained 60° but Ballard thought that a depth of four feet reaching 56° was the catalyst. The second causal factor had to do with cleanliness and ventilation especially with regard to food storage. The quality of food and milk that babies were fed had long been considered germane to the issue but Ballard emphasized the spoilage of originally healthy foodstuffs to a far greater degree than had previous investigators. The third causal factor, more tentative than the first two, concerned feeding and family life. Like other researchers Ballard noted that exclusively breast-fed infants died in the fewest numbers and that the children who had never suckled tended to fare the worst. He saw this as a problem of working women only insofar as surrogate care givers were less conscientious about feeding than mothers. Illegitimate children were in the most precarious position, presumably because their living conditions would be more squalid and a single parent less able to devote the requisite attention to the child.¹³⁴

Ballard's recommendations were not earth shattering for the most part either. Sewerage improvement and the elimination of cesspools headed the list. Drainage of ground that was still left damp was another priority and the sealing of basements with concrete or cement would further protect homes. Other housing recommendations included the widening of streets, increasing the distance between buildings, and eliminating "back to back" housing. He advocated higher standards of cleanliness for cow sheds and dairies (included in 1890 legislation) as well as private homes. Within households Ballard recommended that food not be stored in basements and that pantries be ventilated, moreover he cautioned that milk might need to be boiled.¹³⁵

¹³⁴ LRO 20 D 72/5, Henry Tomkins, MOH 1882, 23-35. The quote is from page 31.

¹³⁵ *Ibid.*

Later comments about the Ballard report are generally favorable. The anonymous author of "Notes on MOH" writes that the "report is an excellent piece of work, and it is interesting to see how nearly the author came to putting his finger on the real cause. He mentions all the conditions which produce flybreeding."¹³⁶ Moreover historian David Reeder's current work also involves consideration of a fly vector.¹³⁷ If flies should prove to be the important vector for diarrhoea it of course remains to explain why flies would be more prolific in Leicester than other parts of Britain. The failed system of sewerage now as then, appears to be the most reasonable answer.

But Ballard could not merely assume the validity of "sewer theory" and as a consequence his investigation had to be more comprehensive than its original intent.

The form in which I received my first instructions was to inquire into the cause of the annually recurring high mortality from diarrhoea in Leicester; but it very soon became obvious that the diarrhoea of Leicester did not differ in its nature from that of other places....Leicester, however carefully looked at, could not be interpreted by itself. The attempt had been made by local observers over and over again, but had failed of any satisfactory result....

[nonetheless] Leicester and its misfortune had still to occupy a notable place.¹³⁸

In striking fashion Dr. Ballard encapsulated the entire dialogue of diarrhoea, the dialogue that made the "disease" into a local problem as much as the mortality itself. Leicester was never the only town that experienced visitations of summer diarrhoea and it was not always the most fatal town. But the repeated listing of Leicester at or near the top of the Registrar-General's returns made local leaders, the medical press, and ultimately the Local Government Board focus their concern about the "disease" as though it was unique to the

¹³⁶ LRO 20 D 72/56, City of Leicester, Notes on MOH, 18.

¹³⁷ Reeder, "Infant Mortality in Leicester 1860-1920."

¹³⁸ Dr. Ballard (1889), quoted in LRO 20 D 72/5, Henry Tomkins, MOH 1889, 21-22.

town. I would suggest that this situation continued as long as it did because diarrhoea remained a mystery, albeit slightly less mysterious over time, throughout the period 1849 to 1891.

The terminal point of this paper, 1891, was not chosen because diarrhoea was suddenly cured at that time. The malady diminished in virulence but it did so gradually.¹³⁹ The year 1891 was chosen primarily because the Gordon sewer system was completed and to a lesser extent because Henry Tomkins died in office shortly thereafter.¹⁴⁰ Continuing this study beyond the completion of the Gordon system would not produce the answer to the problem because "causes of infant diarrhoeal mortality [were] multifarious."¹⁴¹ While I strongly support the notion that "sewer theory" goes the farthest in explaining the difference between Leicester and other towns it is insufficient to account for the "disease" as a whole. F.B. Smith believes that the availability of sterile foodstuffs for infants was the most important ingredient for the diminution of diarrhoea and this argument can not be ignored.¹⁴² By 1905 Leicester had a municipal milk depot that provided sterilized or powdered milk to infants whose mothers could not breast feed.¹⁴³ Moreover Anne Hardy remarks on the overall diminution of fly-breeding as horses on public streets were replaced by automobiles.¹⁴⁴ So three possible solutions to the problem were taking place at roughly

¹³⁹ See infant mortality statistics from all causes 1893-1900 in Isabel C. Ellis, Records of Nineteenth Century Leicester (Guernsey: The Star and Gazette Co., 1935), 33-35. The year 1912 has been cited as when diarrhoea ceased to be a major problem in Leicester. R.A. McKinley and C.T. Smith, "Social and Administrative History," in The Victoria History of the Counties of England, A History of the County of Leicestershire, vol. 4, Leicester, ed. R.A. McKinley (London: Oxford University Press, 1958), 280.

¹⁴⁰ LRO 20 D 72/56, City of Leicester, Notes on MOH, 21. Tomkins died from influenza on 27 March 1892.

¹⁴¹ Dr. Ballard (1889), quoted in LRO 20 D 72/5, Henry Tomkins, MOH 1889, 23.

¹⁴² F.B. Smith, "Health," in The Working Class in England 1875-1914, ed. John Benson (London: Croom Helm, 1985), 47.

¹⁴³ LRO Pamphlets vol. 6, Thomas Windley, Notes on the Work of the Sanitary Committee of the Leicester Corporation from its Formation to the Present Time. 1873-1917, 10. [hereafter Work of the Sanitary Committee].

¹⁴⁴ Hardy, The Epidemic Streets, 186.

the same time and it does not seem possible to consider any in isolation. Again this is a function of the "disease" being more than a singular effect from a singular cause.

We may or may not come across definitive answers in the quest for the agents of diarrhoea but if we do they will likely involve both stagnant sewage and tainted food. We can say for certain that some of the early remedies such as purgatives or opium cocktails would have only exacerbated the problem. But for all the principals in this paper, when the problem went away so did the need to determine its cause. To Sanitary Committee Chairman Thomas Windley, looking back at his forty-four years of service, the Gordon system seemed to be the essential ameliorative factor but his main concern was that overall infant mortality in Leicester had declined from over 20% to something approaching half that number.¹⁴⁵ Windley's relief was evident.

¹⁴⁵ LRO Pamphlets vol. 6, Thomas Windley, Work of the Sanitary Committee, 10.

4. Conclusion

The purpose of this study was to look at public health problems in nineteenth century Leicester in a new way. The lens that makes this possible is the concept of an accepted remedy. It is true that Leicester was unusual among Victorian towns in its handling of the ubiquitous problems of sewerage and summer diarrhoea but this actually helps to illustrate the value of an accepted remedy and the spectrum of possible responses in the absence of such a consensus. Moreover, in the case of the sewerage system, we can see that a large public works project undertaken in advance of the recognition of an accepted remedy can backfire upon those who had the desire and the wherewithal to initiate such a project or on their heirs.

One cannot help but admire the talent and community spirit of a man like Joseph Whetstone. He has been labelled a utilitarian by one historian¹ but I believe that such a label can be applied pejoratively if it implies rationality to the exclusion of compassion. His efforts on behalf of the Wicksteed sewerage system, from blocking the path of the Leicester "improvers" to confounding the control-minded Edwin Chadwick, bespeak a man that tried his best to do what he thought was best for the people of Leicester. Yet the lesson here is not about what a great man Joseph Whetstone was, rather the lesson is that even a great man can make a great blunder on matters of public health in the absence of an accepted remedy.

William Winterton was probably correct in his assessment of the "broad shoulders" of Whetstone. After his death no member of the town council managed to persuade a majority of his brethren to undertake a project that would replace the Wicksteed system

¹ Dinah Freer, "The Dynasty-Builders of Victorian Leicester," Transactions of the Leicestershire Archaeological and Historical Society 53 (1977-78): 43.

until the Local Government Board mandated such a change. All the comprehensive plans that were submitted to the council after Whetstone's death had sewage irrigation as their treatment method; this was also the method that Tulloch insisted upon and Gordon produced. The consistency shown in the recommendations of irrigation from 1870 to 1885 in Leicester implies the existence of an accepted remedy; the successful implementation of such systems in other towns corroborates this existence. But Leicester's local government was not prepared to act voluntarily at that time.

Wicksteed designed his system with thirty years of service in mind. Completed in 1855 it was indeed 1885 before the system began to be replaced. Yet we have seen that there were numerous problems associated with the system beginning less than a decade after it was completed. Though the first complaints about the system were financial and the final complaint was about river pollution, there were continuous complaints throughout the period. The corporation proved reluctant to make anything more than minor adjustments to its pioneering system and this appears to be because of the expensive failure that resulted from taking a well-intentioned chance on Wicksteed and his method.

As the title of the chapter on sewerage states, it was indeed an experiment at Leicester. Neither Whetstone nor Wicksteed would have characterized it as such because they bore witness to lesser experiments that seemed to establish the efficacy of the treatment method. Yet the experiment at Leicester turned out to be an error in the trial and error process that can lead to an accepted remedy. In 1864 Tom Taylor made the point of telling the Select Committee on Metropolis and Town Sewers that there was no remedial method that was acceptable to the relevant community of the national government, engineers, and medical professionals. By all indications such a consensus had developed by about 1870. By then Leicester's officials had become jaded by their experience even though it had

helped convince others what not to do and so they were wary of a newfound accepted remedy.

The problem of summer diarrhoea was a problem that was largely thrust upon the leaders of the town. Given the socio-economic specificity of diarrhoeal mortality it is not unreasonable to suppose that very few town councillors or their associates lost children to this pitiful "disease" between 1849 and 1891. While MOHs John Buck and John Moore were aware of and nonplussed by the "disease" there was no accepted remedy to appeal to for guidance. Joseph Dare's socio-economic perception of the "disease" in 1852 could have led the town's leaders to dismiss the problem as a function of the immorality of the working classes and Moore's perception of its causal relationship to the lack of sewerage in 1853 could have been seen as a problem that the Wicksteed system would soon correct. It was really not until 1868 that numerous deaths, the national medical community, and an obstinate MOH combined to make Leicester's diarrhoea problem the epitome of Britain's diarrhoea problem.

There was no accepted remedy for the problem of summer diarrhoea between 1849 and 1891 despite many investigations into the problem. The Registrar-General's recurring statistics consistently pinpointed Leicester as the problem for a valid reason: Leicester continually lost more babies per capita than any other town in Britain. If this was not bad enough, Leicester's MOH, Dr. Crane, propounded nothing but fatalism. The medical community at that time was not prepared to accept fatalism yet it could not offer an immediate remedy. In the absence of an accepted remedial measure the problem was largely attacked with theories and rhetoric.

It seems that everyone in the relevant community: the medical and local press; the MOHs; the local politicians; and ultimately the central government, subscribed to one theory or another. These theories ranged from the absurd (Richardson) to the scientific

(Tomkins). All members of the relevant community spoke their piece at one time or another yet only Buck and Franklin thought enough of the mothers' explanations to put them in print and that was only to dismiss them. Sometimes in the absence of an accepted remedy it seemed to be a positive stroke to cast negative aspersions on an unacceptable theory. While this was most memorable in Barfoot's reading of the sarcastic "awning" letter before the council, the Lancet engaged in the practice as well. It was a war of words over the loss of infant life in Leicester and there were times that the suffering babies were forgotten or treated in cavalier fashion.

The existence of competing theories of diarrhoea causation prompted the layman, Robert Read, Jr., to ask "when doctors differ who shall decide?" Yet not all doctors differed. "Sewer theory" and "made ground theory" were not mutually exclusive and they were advocated by Moore, Buck and Franklin, Johnston, Tomkins, and Ballard. But a hybrid of these theories did not achieve the status of an accepted remedy because sewerage improvements could not be demonstrated to be ameliorative in the abstract. Clearly Leicester's town council would not have invested more than £100,000 in a new sewerage scheme on the hope that it might prove efficacious against diarrhoea. Moreover all investigations other than the "paradox enquiry" recognized the relative health of breast-fed babies, indirectly or directly implicating common feeding practices among the working classes. This recognition also had little chance to develop into an accepted remedy because of economic realities. Working class mothers in Leicester from 1849 to 1891 were not women of leisure whose husbands could all bring home a family wage. In addition the products that were available to substitute for breast milk were of questionable quality.

The development of an accepted remedy in public health cannot take place solely in the realm of the abstract. In order to convince the arm of the relevant community that is responsible for the implementation of the tenets of such a remedy it must be demonstrably

ameliorative. This usually involves non-professionals who have concerns such as cost-effectiveness, social norms, and practicability. Such persons may require a wealth of evidence to commit limited resources in support of a proposed remedy. Acting hastily may result in unenviable consequences as was the case with the Wicksteed sewerage system.

I believe that the concept of an accepted remedy is a useful tool in understanding responses to problems of public health. It has been the lens which has given focus to this study. I believe that further testing of the concept on problems of public health is warranted.

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