

THE BOOK
OF THE
OLD EDINBURGH
CLUB

The Journal for
Edinburgh History



Neil MacGillivray, 'Epidemic Disease in Edinburgh, 1840–1850',
Book of the Old Edinburgh Club, New Series 11 (2015), pp. 19–34

~~~~~

This article is extracted from **The Book of the Old Edinburgh Club**, **The Journal for  
Edinburgh History** ISSN 2634-2618

Content © The Old Edinburgh Club and contributors. All rights reserved.

For information about The Book of the Old Edinburgh Club (BOEC), including contents of  
previous issues and indexes, see <https://oldedinburghclub.org.uk/boec>.

**This article is made available for your personal research and private study only.**

For any further uses of BOEC material, please contact the Editor, The Book of the Old  
Edinburgh Club, at [editor@oldedinburghclub.org.uk](mailto:editor@oldedinburghclub.org.uk). The Club has a Take-Down Policy  
covering potential rights infringements. Please see [http://oldedinburghclub.org.uk/oec-  
take-down-policy](http://oldedinburghclub.org.uk/oec-take-down-policy).



*Digitised by the Centre for Research  
Collections, Edinburgh University  
Library from the copy in the Library  
Collection*



# EPIDEMIC DISEASE IN EDINBURGH, 1840-1850

NEIL MACGILLIVRAY

This study of epidemics in Edinburgh between 1840 and 1850 will analyse the nature and impact of the outbreaks but will also examine the social and economic conditions prevailing during this time. The extreme poverty of the Old Town inhabitants, it will be argued, was in large measure responsible for the severity and frequency of these outbreaks. Whereas the state of the working class in industrialised cities like Glasgow or Manchester has been studied in detail both by contemporary observers and twentieth century urban historians, there has, however, been a tendency to regard Edinburgh as a city relatively unaffected by the appalling social problems of industrialised cities - and with a well nigh invisible working class.<sup>1</sup> It is my contention that nineteenth century Edinburgh should be seen as a city with industry rather than an industrialised city - as that term is generally understood.<sup>2</sup>

The association between rapid, massive urbanisation and industrialisation on the one hand and epidemic disease on the other is well recognised and has been described by many scholars but it is fair to say that Edinburgh as a city with industry has not received quite the same attention - many nineteenth century writers preferred to dwell on the more picturesque and quaint aspects of the city, an example of the genre being Robert Chambers' *Traditions of Edinburgh* of 1825. Chambers wrote of<sup>3</sup>

that revolution which has ended making Edinburgh a kind of double city—first, an ancient and picturesque hill-built one occupied by the humbler classes, and second, an elegant modern one, of much regularity of aspect, and possessed almost as exclusively by the more refined portion of society.

But it was the 'picturesque hill-built one' that was 'increasingly found to be full of the most loathsome problems.' However, not all writers viewed the city

as elegant and picturesque: in 1838 on a visit to Edinburgh a German tourist using the pseudonym Sebaldus Naseweiss wrote:<sup>4</sup>

Even as matters now stand, the Augean stable has by no means been purified from all its filth and impurities. The lower classes bring up their children with as little regard to the cleanliness and comforts of life as they paid themselves, and thus a natural indifference for such essential requisites to promote the health of the inhabitants from generation to generation.

There are several contemporary accounts of living conditions in the Old Town: James Bruce's *Letters on Destitution and Vice in Edinburgh* (1850); Dr George Bell's pamphlets *Day and Nights in the Wynds of Edinburgh* (1849) and *Blackfriars Wynd Revisited* (1850). These latter became best sellers, not least, as has been observed, since Bell<sup>5</sup> 'displayed the condition of the Old Town to the New'. Bell reckoned that over a thousand people lived in Blackfriars' Wynd in fewer than two hundred rooms, but he was aware that it was impossible to be accurate because of the floating population and the number of lodging houses in existence. His figures are astonishing but when one considers that the census of 1851 recorded 1,266 lodging house keepers in Edinburgh and Leith this lends weight to his estimate.<sup>6</sup> Bell believed that slum living caused fever and that improved housing, hygiene and sanitation were urgently needed - ideas very much in accord with the Chadwickian view of epidemic causation and prevention. Edwin Chadwick (1800-1890) collaborated with three physicians, Thomas Southwood Smith (1788-1861), James Kay Shuttleworth (1804-1877), and Neil Arnott (1788-1874) in his study of *The Sanitary Condition of the Labouring Population of Great Britain* (1842) published first as a parliamentary paper. On a tour of the Old Town in 1839 Chadwick was accompanied

by Arnott and wrote: <sup>7</sup> ‘The most wretched of the stationary population ... that I have ever seen was that which I saw with Dr Arnott ... in the wynds of Edinburgh.’

There were two views of public health and epidemic disease: the first that of Chadwick and his colleagues who believed that clean water and sanitation would eradicate recurrent urban epidemics; the second was that of those who believed dearth and malnutrition caused fever.<sup>8</sup>

There is no doubt that there was malnutrition in Edinburgh during the potato blight in 1846 which had destroyed the staple diet of the poor throughout Scotland. The loss of crops was disastrous in rural areas like the Highlands and Islands but the urban poor for whom the potato was a source of cheap food also suffered acutely. The appearance of scurvy in Edinburgh in the late 1840s was directly related to vitamin C deficiency from the loss of the potato; furthermore other essential nutrients were missing from the diet of the poor and this may account for the fact that during the harvest crises of 1837–39 and 1847–48 fever admissions to the infirmary increased dramatically.<sup>9</sup> The relationship between nutrition and infectious disease has now been accepted—but one of the difficulties of research into the link is that those who are malnourished often live in overcrowded, insanitary conditions and it is not easy to separate the effects of food deprivation from those of a poor environment.<sup>10</sup> Undoubtedly malnutrition affected the individual’s defence against infection but it is undeniable that in the Old Town three other factors had a role in the frequency and severity of the epidemics: lack of water, gross overcrowding, and more or less nonexistent sewage disposal.

#### WATER

There has been remarkably little scholarly interest in the history of water and its importance in hygiene - as Anne Hardy pointed out in a reference to London’s water supply<sup>11</sup> ‘the history of water in relation to public health remains largely unexplored.’ That is certainly true of Edinburgh and although a detailed history of the city’s water provision will not be attempted here the repeated crises over many decades merit some attention. James Colston wrote in 1890 that<sup>12</sup> ‘no one in the present day can realise the sufferings which the

inhabitants of Edinburgh were called upon to endure, on account of a deficient water supply during the latter part of the last century, and for the first twenty years of the present one.’ The deficiency lasted far longer than the first twenty years of the nineteenth century, but perhaps his involvement with council matters coloured his views. Colston had stood unsuccessfully for Lord Provost on three occasions and had been convenor of the finance committee of the Edinburgh & District Water Trust between 1872 and 1890. However, he was remarkably forthright about the situation in earlier years, describing the intermittent supply to the fountains in the Old Town where queues would form at six in the evening with many waiting until three in the morning before the flow began. Some would not have filled their buckets before the supply ceased.

When an Act approved the formation of a Joint Stock Company to supply water to the city in 1819, the Company bought the waterworks from the council and new water arrived in a scheme part engineered by Thomas Telford.<sup>13</sup> This proved insufficient, and Parliament was asked in 1826, 1835, 1837, 1838, 1846 and 1847 for an increase in the water rate to finance a scheme to bring more water from the Pentlands. These demands prompted a contemporary to write that<sup>14</sup> ‘the Water Company appear...to have fallen into a state of indifference to everything but their own dividends.’ The 1837 Bill was resisted by the ratepayers in the Sheriff Court, then in the Court of Session and finally in the House of Lords, their objections being based on the fact that no extra water had been brought to the city since 1824 although the population had increased and Leith had also been supplied with water under an Act of 1826.<sup>15</sup> The city’s financial embarrassments, aggravated by expensive litigation over water, may have delayed improvements in the supply, but there was another reason why it was insufficient for the Old Town’s need - the introduction of water closets in the New Town after 1824 deprived the Old Town of two supply pipes, as these had been diverted for the sole use of the New Town residents in their elegant new houses.

The water company’s manipulation of the truth was quite blatant, issuing a pamphlet in 1835 claiming that<sup>16</sup> ‘there is scarcely any city in Europe where the supply is at once so excellent and so abundant, or the price so moderate.’ Alexander Ramsay, the Inspector of Cleaning and Lighting, had

other views saying that<sup>17</sup> ‘no town in the kingdom was worse off than Edinburgh in respect of water supply.’ He complained that the distances from wells and the stairs to be climbed militated against the use of the ‘precious water’ for cleaning. The shortage of water, he claimed, made it well nigh impossible to propel filth into the common sewer from lanes, closes, alleys, pavements and causeways. Jardine, the engineer on the projects of 1810-11, 1819-23 and 1842-43, calculated that the quantity supplied daily after 1819 was nineteen gallons per person, assuming that all was for domestic use; by 1847 this had fallen to ten gallons, with no account being taken of water used in manufacturing, street cleaning, fire control, steam engines, hotels, brewing, stables and in supplying water to shipping at Leith.<sup>18</sup> At these levels maintenance of hygiene and public health was impossible.

#### OVERCROWDING

The population of Edinburgh doubled between 1790 and 1827, and crucially this occurred when there was a reduction in the available housing stock.<sup>19</sup> The decrease in house building during this period affected ‘filtering down’, the net result being a shortfall of some 6,000 houses by mid-century, at a time when the population had soared from 60,000 in 1801 to 161,000 in 1851.<sup>20</sup> To make matters worse the June fire of 1824 in the Old Town destroyed five six-storey houses, and the November fire of the same year destroyed twenty-two lands of between six and eleven storeys and a further six tenements in Borthwick’s Close. The same November 1824 fire destroyed four double tenements in Parliament Square of between seven and eleven storeys. These included the shop of Kay, the celebrated caricaturist. The November fire alone was thought to have left 300 to 400 families homeless.<sup>21</sup>

The Improvement Act of 1827, which led to the building of George IV Bridge, Victoria Street, Bank Street and Johnston Terrace, caused further depletions to the housing stock. 834 dwellings were knocked down, making some 2,000 families homeless.<sup>22</sup> Many other large tenements were destroyed during the extension of the Glasgow to Edinburgh railway line from Haymarket to Waverley. Thus by accident and by design, over the space of twenty years in

which Edinburgh had experienced a rapid increase in population, several thousand people were left homeless.

#### SEWAGE

The lack of water prevented the construction of a closed system of sewage with the result that the so called “foul burn” became the main sewer, draining much of the Cowgate and the High Street before wending its way past Holyrood Palace on through Restalrig to the firth—although how much reached the sea is questionable as the farmers diverted the burn to irrigate and fertilise their fields.<sup>23</sup> The administrative body responsible for cleaning and sewage was the Police Commission which arranged for the collection of dung, both human and animal, from streets and necessities around the city. The Colledge necessary near the Old Quad with forty-eight seats was no doubt a valuable source. The accumulated manure was stored in several sites on the outskirts of the city with a major dung depot near the Dalkeith Railway occupying half an acre to an average height of nine feet. Receipts from the sale were considerable—the minute book recorded sales for the year ended 15 May 1842 amounting to £10,421/1/9 and ¾d.<sup>24</sup> The shortage of water and the presence of sewage in an overcrowded Old Town were hardly conducive to the public health—and so it proved.

#### THE EPIDEMICS

The most terrifying of the communicable diseases were fever and cholera, although smallpox, measles, whooping cough, scarlet fever and influenza also caused appreciable morbidity and mortality. However, the emphasis in this article will be on the fever and cholera epidemics which were reported and documented in considerable detail by doctors and laymen alike.

By the 1830s, the dread of fever, which was endemic in city slums, was felt throughout urban Scotland. Epidemics were frequent, and even as late as the 1860s, by which time fever was less common, Dr Henry Littlejohn (1826–1914), Edinburgh’s first medical officer of health, wrote in 1865 that<sup>25</sup> ‘fever is never entirely absent from Edinburgh’ and that ‘it

would yearly be manifest in the epidemic form, did not the poor enjoy unusual facilities for the early treatment of the sick, and the removal of infected persons to our large hospital.<sup>7</sup>

The term “fever” was used as a diagnosis by physicians and laymen alike, often with an adjective indicating a feature of the illness or the place of origin. In sixteenth century England, it was called “spotted fever.”; in overcrowded, insanitary prisons it was known as “gaol fever”; in time of war it was known as “camp fever”, and at sea as “ship fever.” When it appeared amongst vagrants or beggars, it was known as “road fever”, and in times of scarcity, it became “famine fever.”<sup>26</sup> In mid-nineteenth century Edinburgh, the term was used without qualification, and both St Cuthbert’s and Greyfriars’ burial grounds simply recorded fever as a cause of death.<sup>27</sup> By 1846, however, doctors started to use more modern diagnostic terms, with Dr James Stark (1811-1890) using typhus fever rather than fever in his reports on the mortality of Edinburgh and Leith.<sup>28</sup>

There were many theories as to the cause of fever, with physicians broadly supporting either contagion or alternatively miasma, despite a lack of hard evidence for either view. Miasma was thought to be a poisonous emanation from rotting animal matter which could in certain circumstances cause disease. Those who believed in the principles of the sanitarian movement were in this camp, considering that epidemic disease originated in dirt where sanitation was poor or non-existent. It was accepted, for example, that smallpox and leprosy were spread by contagion, but doubts were beginning to be expressed about the contagious nature of cholera and fever.

Robert Deuchar, secretary to the Edinburgh Fever Board, not medically qualified in his own right but no doubt influenced by physicians on the Board, wrote in 1844 that stables, byres, tanpits and receptacles for manure were nuisances,<sup>29</sup> ‘which are exceedingly offensive and injurious, but experience has shown that malaria arising from these sources, does not appear to be the true cause of fever, or the leading cause of its extension among the poor.’ Professor Robert Christison (1797-1882) was of the opinion that<sup>30</sup> ‘continued fever occurs only when work is scarce, wages low, provisions dear and the labouring classes consequently in unusual distress.’ William Pulteney Alison (1790-1859) was convinced that destitution and fever were inextricably related.

His pamphlet, *Observations on the Management of the Poor in Scotland, and its Effects on the Health of the Great Towns*, (1840) pointed out the link between poverty and disease, thereby making a strong case for an investigation into poor law provision.<sup>31</sup> The controversy about the cause of fever perhaps delayed the discovery that fever was not a single disease but in fact three distinct diseases: the first being typhus, associated with dirt and overcrowding and with periods of economic depression and dearth: ‘now it was the constant accompaniment to life in the courts, closes, and wynds of the industrial towns. It was the poor man’s disease ... the product of squalor, insanitation, overcrowding and verminous conditions, a concomitant of working-class housing.’<sup>32</sup>

Typhus is spread by the louse, infection resulting in fever with severe headache, chills, muscle pains, vomiting and a rash. Cerebral involvement is more marked in typhus than in any comparable febrile disease and it is this degree of clouding and stupor that has given typhus its name, derived from the Greek for smoke, *typhos*.<sup>33</sup> Typhus can be a relatively mild illness in children but severity increases with age: mortality is five percent in those below the age of twenty, ten to fifteen percent in those below the age of forty, fifty percent in those aged under fifty, and the disease is generally fatal over sixty years of age.

The second is relapsing fever, which, like typhus, is also louse-borne. It is characterised by one or more relapses after the primary fever has settled. As with typhus, relapsing fever is associated with filth, poverty and famine, and is the most epidemic of all epidemic diseases, frequently occurring at the same time as outbreaks of typhus. The case fatality in relapsing fever can be as low as five per cent when conditions are favourable but during war or famine it can rise to seventy per cent.<sup>34</sup> This type of fever appears to have been less marked in the nineteenth century: Christison in 1863 wrote of the disease as being<sup>35</sup> ‘far from deadly’; William Jenner (1815-1898), physician to the London Fever Hospital, from his experience of the disease in London considered that ‘death is a rare termination of relapsing fever’ and Jackson, a Leith physician, in a careful statistical analysis of the epidemic of 1843, concluded that ‘the general prognosis of the simple epidemic fever is most favourable.

Edinburgh has a prominent place in the history of relapsing fever. The term was first used in 1843



by David Craigie (1793-1866), physician to the Edinburgh infirmary and editor of the *Edinburgh Medical and Surgical Journal*.<sup>36</sup> The pathologist, William Henderson (1810-1872), was first to differentiate typhus and relapsing fever. This achievement was based on the case of Isabella McDonald, of 327 Canongate, who was admitted to hospital in April 1843 with typhus. She was discharged in May, and between May and July her mother and three sons developed typhus. One of the sons, aged thirteen, died in the fever ward. Henderson says<sup>37</sup> ‘the epidemic fever did not commence in the stair till June,— and in the months of August, September, and November, the surviving five members of the family, who had been affected with typhus were now seized with the epidemic fever, which was then abundant among the other families in the stair.’ Physicians knew that an attack of typhus bestowed on the survivor a prolonged period of immunity and Henderson reasoned that the second attack of fever, which he called epidemic fever, must differ from the first, concluding that there were two diseases, typhus and epidemic fever. The third member of the “fever family”, typhoid fever, was rare in Edinburgh during the early nineteenth century, and can therefore be ignored in this review.

#### FEVER EPIDEMICS

A report of the 1843 epidemic emphasised<sup>38</sup> ‘the great misery and destitution [that] prevailed at the time amongst the poor’, very similar to Christison’s account of the epidemic of 1835-36 referred to earlier. There are differing views as to its origin and its nature: Murchison says it was mainly relapsing fever with typhus comparatively rare, and that the epidemic began in 1841 and continuing until 1844.<sup>39</sup> Alison told of ‘the diffusion of fever, particularly of that new form of fever which has sprung up since 1842, almost exclusively in Scotland...’. Christison thought there were two epidemics, one in 1841 and a second in 1843-44, the first typhus and the second relapsing fever. The evidence on the whole supports Christison’s view that there were two epidemics, both outbreaks involving typhus and relapsing fever with the latter predominating.

By 26 September 1843 the infirmary had 469 fever patients, many in garrets, some on floors, and some

two to a bed, a situation which had not improved by October, when, at a meeting with the governors of the Royal Lunatic Asylum to discuss converting the Bedlam into a temporary fever hospital, the chairman said that 443 fever cases were being treated and that on average eighty were being turned away daily. The chapel was being used as a ward, as were two temporary wooden buildings holding fifty-five patients. Three emergency fever hospitals were full. The crisis continued: fever admissions increased from 842 in 1842 to 3,339 two years later.<sup>40</sup>

Whether there were two epidemics in the period 1840-44 is uncertain, but the increase in 1843 and 1844, and the contention of Christison and others that there was a second epidemic of relapsing fever in 1843, provides strong evidence in support of two outbreaks. Whatever the situation, there is no doubt that the numbers dying were such as to alarm the council and the public. People who lived close to Greyfriars’ kirkyard were especially concerned about pauper burials in there, and by January 1845 the council was seeking land for a new public cemetery. At about the same time, the Kirk Session of St Cuthbert’s and the managers of Calton and Warriston cemeteries informed the council that they were no longer prepared to bury the poor.<sup>41</sup> With the appointment of Dr James Stark as a semi-official recorder in 1845 records of the city’s mortality at last became available: these reveal that the yearly mortality increased from 3,688 in 1845 to 7,026 in 1847 with 5,724 dying in 1848.<sup>42</sup>

Stark calculated that Edinburgh’s average mortality between 1840 and 1846 was 3,972 deaths annually, one death for every 35 inhabitants; in 1847 it was one in 20 and in 1848 one in 25. Manchester had one death for every 26 of its population, Liverpool, one in 23, Glasgow, one in 21. From 1846 the deaths from infectious disease almost doubled, largely due to typhus. This level was still being maintained in 1848, when cholera deaths augmented the total. In the three years from 1846 typhus deaths amounted to 2,694 out of a total mortality of 17,667.<sup>43</sup>

#### THE FEVER BOARD AND THE POLICE COMMISSION

Only the threat of cholera in 1848 forced the Edinburgh medical colleges to take action. Until then,

the management of fever epidemics was in the hands of the Fever Board, on which sat several of the city's most prominent medical men. Responsibility for the cleansing and fumigation of houses with fever lay with The Destitute Sick Society until 1830, after which the Society restricted their activities to charitable work. Their *quasi* public health role was taken over by the Fever Board, whose responsibilities were eventually acknowledged in 1837 by the Town Council with a grant of £100 per annum. In spite of this recognition, the Fever Board remained a voluntary body.<sup>44</sup> The Board believed that the Edinburgh method of removing patients to hospital was preferable to the Glasgow approach where fever victims were nursed at home, commenting:<sup>45</sup>

'it must be palpably evident that nothing less than the removal of the patients to an hospital, and a complete separation effected betwixt the sick and the healthy, can possibly prove a successful check to the increase of fever in Glasgow, or in any other large city. Similar scenes are occasionally seen in this town, but never when the combined exertions of the Fever Board and Royal Infirmary can prevent them.'

The increase in fever so concerned the Police Commissioners that they considered applying to parliament for a new act 'to consolidate and improve the existing Police Acts' but in the end they merely instructed the Inspector of Cleaning and Lighting, Alexander Ramsay, to prepare a report on fever and its prevention.<sup>46</sup> His report included figures from the Infirmary and the Fever Board showing that the number of fever cases from 1840 to 2<sup>nd</sup> December 1843 totalled 12,157 with the greatest number, 3,008, in 1843.

After the establishment of the Scottish Poor Law Board of Supervision in 1845, the uncertainty as to who was responsible for cleaning and fumigating houses, stairs or closes became more marked. In 1847 the City Parochial Board asked the Police Commission to clean houses in the Grassmarket but the Commission's Inspector claimed that the Parochial Board was mistaken as to the provisions of the Police Act, saying that if fever prevailed in houses which were not lodging houses the Fever Board should be applied to<sup>47</sup> 'as the Police Commission annually contribute £100 to the funds of that society, and it would rather be anomalous in the Commission to contribute to the funds of a Society to take steps to arrest the progress of a disease and at the same time

be called to perform the work themselves.'

Edinburgh fever patients were treated in special wards until 1843. In that year, Dr John Rose Cormack drew attention to the London system where fever patients were distributed throughout the hospital. After discussion, the Infirmary adopted the system; the Infirmary minutes of June 1842 record Dr Graham's proposal that their [fever patients] diffusion through the ordinary wards with certain precautions would be safe and beneficial. He thought that the concentration of patients in fever wards was dangerous to the medical and nursing staff since<sup>48</sup> 'a certain degree of concentration in contagious matter was necessary for its efficacy' and he could not recollect 'a single instance of a gentleman acting as his clerk in a fever hospital escaping without an attack of the disease'. This was not an exaggeration and it was not solely the clerks who suffered, for the Infirmary minutes of 25 February 1839 recorded the deaths from fever of Dr Brown, of the House Governor, and of the Apothecary.<sup>49</sup>

The minutes of the next meeting show that a discussion took place about the bathing of fever patients, their donning of hospital clothes on admission and the optimum space between beds.<sup>50</sup> In October the results were analysed and considered to be relatively successful, despite ten patients contracting fever in non fever wards with three deaths. The trial was extended, the one condition being that fever patients were not to be placed in the servants' ward, perhaps to minimise the risk of a servant contracting the disease and transmitting it to his or her employer.<sup>51</sup> Cases in which 'no direct communication with fever patients could be demonstrated' were thought to have been caused by mattresses which had been used too soon after a previous fever patient. In December it was agreed to prolong the trial with ten strict conditions: patients were to be washed on admission; clothes were to be removed and cleaned; special mattresses and bedding were to be for the sole use of fever patients; sufficient space to be left between beds 'to prevent the atmosphere becoming charged with the exhalations from his person or his bedclothes'; fever patients were to be washed regularly; and adequate ventilation was to be ensured by fitting ventilation boards to all windows.<sup>52</sup> These conditions reveal the confusion in the minds of doctors and laymen as to how fever spread. There clearly was a suspicion that mattresses, bedclothes and clothing could transmit the

poison, but at the same time as steps were being taken to prevent this, measures were being implemented to avoid atmospheric spread by diluting the amount of poison in the air. The new system of placing fever patients in general wards was not without its critics and there were concerns about adverse publicity. At a meeting in January 1843 it was agreed 'to delay any public discussion of this important and delicate subject...and the Reporters for the Newspapers should be requested to take no notice of the subject in their report of the proceedings of the meeting.'<sup>53</sup> Indeed a compliant press.

The threat of cholera and the setting up of the Board of Health in 1848 brought order and a measure of co-operation to the management of the public health and the control of epidemics. A lack of money and a shortage of beds for fever patients was a recurring theme in the minutes of the infirmary managers at this time.<sup>54</sup> The following extract, from the Infirmary contributors' report, demonstrates how the committee played on middle class fears and, in emphasising the duty of Christians to care for the poor, the report is quite explicit that this is not a plea for selfless giving. The Christian doctrine of charity in which there is no thought of reward has been altered to one in which charitable donations can preserve and perhaps guarantee personal and family welfare.<sup>55</sup>

'It is physically impossible that epidemics or contagious diseases can long or violently prevail in one class of a society, or in one district of a town, without soon extending in some degree over all. It is impossible that the higher classes can so effectually insulate themselves from their poorer brethren, as that they, and the dearest objects of their regard shall not be frequently exposed to the mortal attacks of any disorder that may gain a general footing. To attack the evil in its stronghold by an efficient system of medical treatment or prevention required money from those who had it. Perhaps this very law of society is a dispensation of Providence for enforcing more powerfully the obligations of compassion and beneficence, and it ought to be a source of satisfaction to the comparatively wealthy, that they may thus at once consult the temporary welfare of themselves and families, and discharge those duties to the poor which are among the most essential and conspicuous parts of Christian charity.'

The participation of prominent doctors in the work of the Fever Board hints at a move away from the concept of health as a private concern towards a realisation that the health of the community was crucial. The link between fever and destitution was a recurrent theme of physicians in the 1840s. They recognised that lack of food, if not the cause, had some part to play but

they were much less certain as to how the contagion was transmitted and were therefore unsure as to how to deal with the recurrent epidemics. The preferred method in Edinburgh was hospitalisation and then the cleansing and fumigation of the homes from which the patient had come. How much influence the sanitary movement had on the changes is not clear but it is likely that the concentration of fever and cholera victims in the same neighbourhoods eventually persuaded the city fathers that improvements in housing, water and sewage were essential. Although fever and cholera had the greatest impact on society, the epidemics of measles, whooping cough, smallpox and scarlet fever were responsible for great childhood mortality and these will be looked at next. There is no yearly record of the morbidity and mortality from these but it is possible to gain an impression from other sources.

St Cuthbert's Church burial records show that in 1841 there were no deaths from measles or whooping cough and only one smallpox death. During the first six months of 1842 no measles deaths were recorded but for the rest of the year and for the first eight months of 1843 there were at least three deaths from measles each month, the ages ranging from eleven months to five years. The age range is similar to that recorded by Alexander Watt of Glasgow in his report on the vital statistics of large towns in Scotland for 1839, 1840 and 1841: of 325 deaths only twenty-three were over five years of age and only one of these was over the age of ten.<sup>56</sup> From an examination of deaths in Watt's data, St Cuthbert's records and Stark's it is probable that epidemics of measles occurred in 1839, 1842-43 and again in 1846-47. This three to four year cycle is partly the result of the immunity developed by a cohort of infants infected by measles and partly from the protection bestowed on infants by their mothers. Children born in 1839 and 1842 would have been immune for several months by virtue of transferred maternal antibodies but by the next epidemic the immunity would have lapsed. Many would have contracted measles thereafter, some dying from secondary respiratory infection. This increased susceptibility to respiratory infection in children is thought to be the result of damage to the protective function of the lining of the respiratory tract from vitamin A deficiency, and, as has been shown earlier, there was undoubted malnutrition of adults and children in the Old Town.



In 1845 infectious disease accounted for 2,522 of the total of 7,416 cases treated at the Royal Public Dispensary: epidemic fever was the most common with 2,150 cases followed by whooping cough with 268 cases, and measles with 87 cases.<sup>57</sup> The mortality from measles, whooping cough, scarlet fever and croup in the three years 1846–1848 was 1,468. In 1846 there were 251 deaths from whooping cough and 183 deaths from measles; in 1847, 279 whooping cough fatalities and 217 from measles; in 1848 there were 270 deaths from scarlet fever. These figures indicate the lethal nature of these diseases in a non immunised population of children whose natural resistance was impaired by nutritional deficiencies and social deprivation.

#### CHOLERA

The arrival of cholera in 1848 thrust an additional burden on the city when fever had already stretched the ability of its hospitals to cope. In this section, the response of central government to cholera will be examined along with that of the municipal authorities who joined with the medical colleges and the general medical profession in attempting to control spread and advise effective treatment.

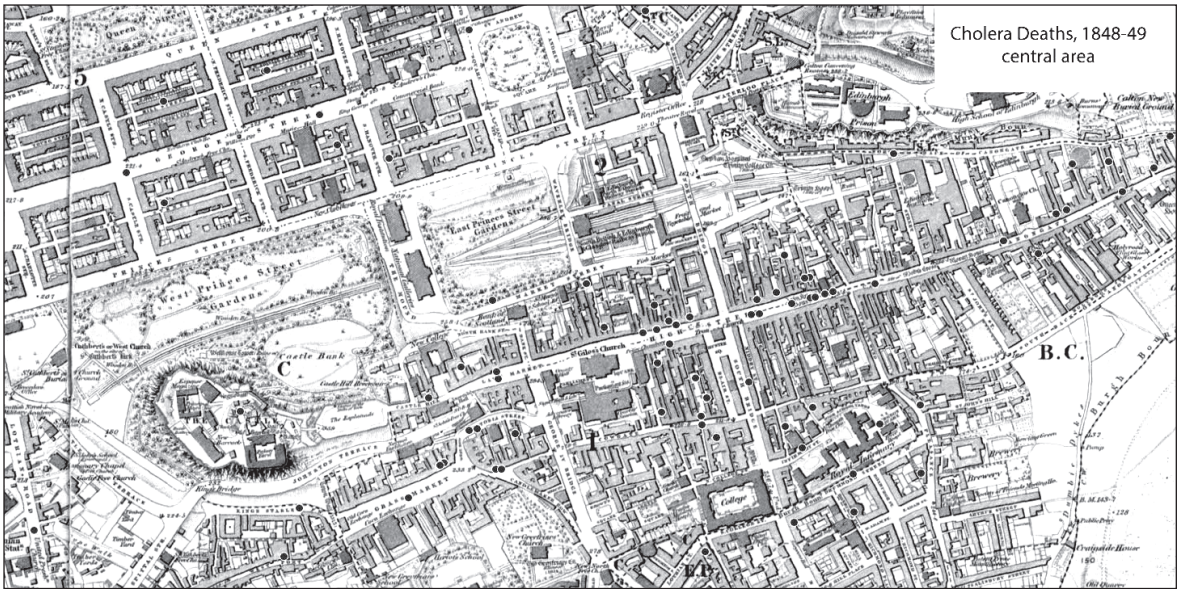
Cholera was terrifying in the rapidity with which it struck, and the appalling image of the dying victim, ‘perhaps young and attractive in the morning, by nightfall...shrivelled wrecks with darkened bluish skin, sunken eyes and protruding teeth,’ explains why no affliction was feared more. Death from cholera was called a dog’s death, *mort de chien*, and sometimes referred to as the blue terror.<sup>58</sup> The French physician, Magendie, described it as<sup>59</sup> “a disease which begins where other diseases end, with death”, cholera cadaverised its victim. As cholera spread through Europe the British authorities awaited its arrival with apprehension; they feared the disease and perhaps feared even more the effect an epidemic might have on the people. This concern as to the reaction of the mob was very evident in Edinburgh. Although comprehensive mortality records for the 1840s were compiled and published by Dr James Stark, during the cholera epidemic he was asked by the council to pause publication, a decision presumably taken to prevent public unrest.

The Royal College of Physicians of Edinburgh met on 12 October 1848 ‘to consider the steps to be taken by the College with reference to the present appearance of Cholera in Edinburgh.’ The President, Professor Christison, informed his colleagues that the Councils of the two Royal Colleges had met with Town Council representatives in January to prepare ‘but that the time for said preparation had not arrived.’ In August he told the Lord Provost ‘that the necessary preparations ought to be no longer delayed...’ and a meeting of the two College Presidents with the civic authorities took place on 29 September and with the Parochial Boards of Edinburgh on 5 October. Urgent measures to deal with the threat were proposed but it was pointed out that the new act for removal of nuisances removed responsibility from local authorities giving it instead to the General Board of Health in London.<sup>60</sup> The meeting concluded that nothing could be done without the approval of the London Board and therefore ‘the Lord Provost was instructed to beg that the Board would immediately announce the measures which they deemed advisable, because the Cholera had appeared in more quarters of the city than one since the 1<sup>st</sup> instant.’ Christison wrote to Mr Chadwick, a Board member, ‘urging the necessity of immediate measures’ and as a result of this letter the Board sent Dr Sutherland to assist the Edinburgh authorities. A Local Board was already in place, consisting of the Lord Advocate, the Dean of Guild, the Sheriff of Edinburgh, the Chairman of the Board of Supervision for the Poor and the two College Presidents.<sup>61</sup> This Board met to prepare several important measures but delayed their implementation<sup>62</sup> ‘on account of a doubt being entertained as to the extent of the Powers conferred by the General Board of Health upon the Local Board.’

The Edinburgh committee was unhappy with the attitude of the General Board who were not acting with the urgency that the committee expected. The letter from Christison to Chadwick conveys this point of view in no uncertain terms:<sup>63</sup> ‘if this be the advent of the epidemic we are taken quite unprepared... its [the cholera] slow progress on the Continent led us here, as it seems to have also led you all in London, to be slow to believe that any great preparation would be necessary... the initiative rests with your Board.’

The *Scotsman*, reporting a parliamentary debate on the cholera bill, pointed out that the absence of provision in the bill to extend the proposed sanitary

EPIDEMIC DISEASE IN EDINBURGH, 1840-1850



Distribution of Cholera Deaths, Edinburgh 1848-49. Royal College of Physicians of Edinburgh Archives, Daily Returns of cholera cases to the committee of the Royal College of Physicians of Edinburgh, November 1848 to November 1849, 2 volumes. RCP/COL/2/3/2. Map produced by MESH. My thanks to Eric Grosso for assistance.



measures to Scotland meant that<sup>64</sup> ‘we are left wholly unprepared, and we greatly fear that our cities and towns will remain as dirty, undrained and ill-ventilated as ever, till the actual entrance of the dreaded plague shall arouse us to some feverish efforts of hasty and superficial reformation.’ The citizens also were becoming anxious: on 18 September a ‘Stockbridge resident’ complained to the *Scotsman* of the filthy condition of the Water of Leith, reminding the public that the 1832 epidemic had broken out in the Water of Leith village—a claim, however, that is not borne out by accounts of that epidemic. Nevertheless, conditions in the city were causing alarm and the feared epidemic was not long in arriving.<sup>65</sup>

It is likely that cholera arrived by sea from mainland Europe, for during the weeks before the outbreak, ships docked in Leith from Hamburg, Rotterdam, Riga, Dantzig, Antwerp and St Petersburg.<sup>66</sup> Three ships from Hull were at Leith in late September and early October and although the official report says that the Edinburgh cases were the first in Britain, there is a later reference to cholera in both Hull and London in September. However, Creighton says that the infection reached Scotland within a few weeks of its appearance at Hamburg on the German coast.<sup>67</sup> There can be no certainty as to the source or how it arrived in Edinburgh.

In 1831 the Royal College of Physicians of London declared that cholera was contagious and recommended quarantine measures but by 1848 this theory had been dismissed as out of date. The newly formed General Board of Health stated that it was not contagious, a decision influenced by the fact that the Board<sup>68</sup> ‘like its secretary Edwin Chadwick, was aggressively miasmatic’—contagion theory was now considered old fashioned. So convinced was the Board that they dismissed out of hand any possibility that contagion might have been the reason that nurses and a washerwoman became victims of cholera, arguing that these women developed cholera because<sup>69</sup> ‘there had been premonitory diarrhoea which had been neglected’, or there was evidence of ‘over fatigue’ or there had been ‘some act of intemperance.’ The Board advanced many reasons for the disease: overcrowding, filth, malaria from putrescent mud, dampness, want of drains and bad drains, graveyards, unwholesome water and finally food, as evidence advancing examples of cholera appearing where such conditions existed. Theories of

causation abounded but despite all efforts the disease was relentless and those who developed cholera suffered appallingly.

A cholera victim may excrete as much as sixty litres of fluid with several million cholera organisms in each millilitre of fluid, making the potential for environmental contamination enormous.<sup>70</sup> Cholera spreads when infected excreta pollute water sources and water for domestic use may also become contaminated during storage—particularly likely to happen when drinking water is kept in open, wide-mouthed containers which allow the entry of unclean hands. Food contamination occurs when there is a hygiene failure by a food handler, when contaminated water is used to wash food, or when contaminated sewage and night soil is used to fertilise growing crops.<sup>71</sup>

Spread by fomites is dependent on the length of time bacteria survive on certain materials and objects, and these are influenced in turn by the degree of contamination, temperature, pH, moisture, salt content, presence of organic matter, texture and on the nature of the substance. For example the cholera organism survives on dry linen for five days at room temperature and on moist linen strips for five weeks. It survives four days on wool, two days on leather; one or two days on coal, certain metals, and on cutlery. In this article direct person to person transmission is understood to mean through direct contact only.<sup>72</sup> Pollitzer in his authoritative work published by the World Health Organisation in 1959 says that contact infection may be direct when the hands of a family member or neighbour are soiled and poor hygiene then permits transfer into the mouth of the contact; in other cases the contact may be indirect through shared food, water or household utensils.<sup>73</sup>

Chronic malnutrition damages the immune response and although there is no firm evidence that malnutrition increases susceptibility to cholera it has been postulated that the decrease in stomach acid in the malnourished may increase the risk of contracting the disease.<sup>74</sup> Those with low or absent stomach acid have a higher risk of developing cholera. The converse is also true: those with high stomach acid have greater protection. Beer drinking is known to increase acid production and therefore has a protective effect, whereas cannabis smoking reduces gastric acid, possibly explaining the prevalence of low gastric acid in parts of India and the high incidence of cholera.<sup>75</sup>

On 7 October 1848 the Police Commissioners' Cleaning Committee arranged to employ thirty extra men and Dr Glover, the police surgeon, was instructed to apply to the managers of the infirmary, dispensaries and parochial boards for access to their fever records. The reasoning behind this request was a belief that cholera followed in the tracks of fever and focussing cleansing efforts on houses where fever had raged might be successful in halting the spread. On the same day Dr James Stark wrote to the *Scotsman* about two cases of Asiatic Cholera at Dundee, and three at Hull, enquiring<sup>76</sup> 'why nothing as yet been done in Edinburgh to prepare us for a visitation of this formidable epidemic.' Stark praised the Metropolitan Sanitary Commission and its anti-contagionist stance that 'proved to demonstration, that this disease is not infectious, is not communicable from the sick to the healthy, from the dead to the living.' There were many petty disagreements among doctors: Glover complained that Stark had demanded access to cholera reports, on being refused Stark presented a signed order from Dr Sutherland, countersigned by the Lord Provost, requesting Glover to hand over the documents, explaining that the General Board of Health had asked him<sup>77</sup> 'to procure and report to them the numbers of cases of cholera as they occurred.' There were other administrative disagreements, such as when the Parochial Boards' instructions interfered with the duties of the Police Commissioners as laid down by Act of Parliament and the minutes recorded<sup>78</sup> 'as much good might be done by the united efforts of the Parochial Boards and Commissioners of Police, it is desirable that the jurisdictions of the respective Boards be preserved and an effective co-operation secured.' The disputes as to who was responsible for the cleaning of houses, closes and stairs and who should pay for these activities continued for several weeks. Finally on 8 November a meeting of the Police Commission, the Parochial Boards and the two medical colleges agreed that the Police Commission would undertake external cleaning and the Parochial Boards would be responsible for internal cleaning.<sup>79</sup> There were further rows involving Dr Glover and his employers concerning discrepancies between Glover's figures and those of the College of Physicians. There were also concerns about his expenses, the commissioners regretting that 'he had exceeded his authority incurring more than he was allowed' but finally agreeing to pay him sixty-three

pounds.<sup>80</sup> Dr Glover was in the unenviable position of having to not merely investigate cases of cholera and to collate returns, but also to cooperate with local boards, medical colleges, the Board of Health in London and Dr John Sutherland, the Board's representative in Scotland, a well nigh impossible task.

Christison in the letter to Chadwick quoted above, wrote<sup>81</sup> 'it is no matter whether the disease arises from infection, Malaria, or any other cause—in any view one may take of it there is a Local cause which, if it do not produce, at all events promotes, the disease...'. This equivocation may have reflected genuine doubt in Christison's mind or may have been included to forestall unwelcome and, in Christison's view, unhelpful proposals from Chadwick and the Board of Health. In 1832 Christison believed in contagion theory—in a letter to David Moir (1798–1851), a Musselburgh surgeon and member of the town's Board of Health during the earlier epidemic, Christison supported 'the doctrine of contagion' and suggested that Moir record the names of people from nearby localities in the habit of visiting towns where cholera was present but who did not enter the houses where there were cholera patients. Christison believed that the results would show<sup>82</sup> 'that scarcely any such person has been attacked', clear evidence in support of the contagion theory. During the sixteen years between the first and second cholera epidemics miasma theory gained acceptance, largely through the efforts of the sanitary movement, and it is possible that Christison began to be persuaded that contagion might not be the whole story.

The cholera records in the Royal College of Physicians of Edinburgh have details of seven hundred and forty cholera patients from the city and neighbourhood: the first victim recorded was John Kinnear, a boy of thirteen of 14 Westport who died on 4 October after an illness lasting a mere twenty hours. His sister age two died on 5 October. This first wave lasted until April 1849 with no further cases until 12 July 1849 when a second outbreak began and continued until the end of the year.<sup>83</sup> These records completed by medical officers consist of a form with the patient's name, age, occupation, address, state of living accommodation, habits of victim, contact with other cholera patients, date of onset and outcome, treatment in hospital or at home and whether there was a post mortem examination.

## Cholera Returns, Royal College of Physicians of Edinburgh 1848–49.

|                | Cases | Cured | Died | % Mortality | % of total |
|----------------|-------|-------|------|-------------|------------|
| October 1848   | 86    | 22    | 64   | 74.4        | 11.6       |
| November 1848  | 234   | 86    | 148  | 63.2        | 31.6       |
| December 1848  | 133   | 68    | 65   | 48.8        | 17.9       |
| January 1849   | 42    | 15    | 27   | 64.2        | 5.6        |
| February 1849  | 24    | 8     | 16   | 66.6        | 3.2        |
| March 1849     | 13    | 5     | 8    | 61.5        | 1.7        |
| April 1849     | 2     | 0     | 2    | 100.0       | .27        |
| May 1849       | 0     | 0     | 0    | 0           | 0          |
| June 1849      | 0     | 0     | 0    | 0           | 0          |
| July 1849      | 5     | 3     | 2    | 40.0        | 0.67       |
| August 1849    | 42    | 15    | 27   | 64.2        | 5.6        |
| September 1849 | 100   | 37    | 63   | 63.0        | 13.5       |
| October 1849   | 36    | 14    | 22   | 61.1        | 4.8        |
| November 1849  | 0     | 0     | 0    | -           | 0          |
| December 1849  | 2     | 1     | 1    | 50.0        | .27        |
| Total          | 719   | 274   | 445  | 64.2        |            |

There is no evidence as to the mode of spread in Edinburgh nor is there any certainty as to how the infection reached the city. Even the date of the first case is doubtful. On 7 October the *Scotsman* reported six to eight cases in the West Port, the Grassmarket, Canongate and Low Calton and three or four in Newhaven. Writing in 1891, Creighton said that the epidemic began in Newhaven and Edinburgh on 1st and 2nd of October respectively, and arrived in Leith on 9th October: the Edinburgh outbreak ceased on 18th January 1849 having affected 801 people of whom either 448 or 478 died, 196 males and 282 females.<sup>84</sup> Creighton does not explain why he gives two sets of mortality figures but what is more surprising is that he entirely omits the second wave of attacks in the summer and autumn of 1849; he must have been aware of the official report which, although critical of Scottish mortality statistics, did at least have records as to when the epidemic began and ended.<sup>85</sup> He records that a Cholera Hospital was opened in Surgeons' Square on 28 October and of

248 admissions up to 14 December, 154 died. Stark's statistics were ignored by Creighton as were burial records. St Cuthbert's figures are accurate and well kept, showing that twelve cholera victims were buried in November 1848, eleven in December, seven in January 1849 and one in February, the first victim being Mary Hossack, aged forty-nine from Hastie's Close, Canongate.<sup>86</sup>

The mortality in Edinburgh was 64 per cent as compared to 50 per cent in other European outbreaks with mortality greatest among the young and the elderly.<sup>87</sup> The mortality under nine was 67 per cent but between ages ten and nineteen it improved to 40 per cent, then increasing once more with age, until among the over 60s mortality was 87 per cent. The greatest number attacked were between the ages of twenty and forty-nine, with 458 deaths. These figures were confirmed by the Board of Health, who calculated that in Glasgow that from 2,322 attacked by cholera, 1,058 died, a mortality rate of 45.5 per cent.<sup>88</sup> Cases were predominately from the Old Town with fewer



than five per cent from the New Town, although there may have been patients nursed at home whose names were not passed on to the cholera board or the police surgeon. Some practitioners may have decided not to record their cholera patients to prevent unwelcome visits from Board of Health officials as happened to Dr John Myrtle's patient who lived in Howe Street in the New Town.<sup>89</sup> There is no doubt that the epidemic hit the poor hardest, with 35 per cent of victims being drawn from labourers, servants or their families, whilst poor areas such as Burt's Close, Blackfriars' Wynd, College Wynd and Whitehorse Close in the Old Town accounted for sixty-eight cases.<sup>90</sup>

The high concentration of cases in a relatively small area might suggest that a public water supply was the source. However, in the Old Town water from the Pentland hills was piped to closed wells in various locations and there is no evidence that any of these wells was infected—it is more likely that spread was by contact, by hands soiled with infected dejecta, by contaminated food, by water utensils or through fomites, such as bed linen or clothing. This latter possibility is supported by the predominance of females affected, (60 per cent), a figure that can only be explained by direct or indirect contact spread rather than by water.

Some authorities consider contact spread to be rare, pointing out that the disease does not usually show a tendency to familial spread but that infection may become rampant in premises where people live crowded together under particularly insanitary conditions—as was undoubtedly the case in the Old Town. There was a high mortality, almost 20 per cent higher than in Glasgow but roughly similar to rates quoted by one authority, Pollitzer; unusually there was an excess of females, 448, as against 292 males, whereas in England the opposite was the case. The higher incidence in women supports the theory of spread by contact and fomites—had the transmission been water borne the sex incidence should have been identical.<sup>91</sup> Women were at greater risk of infection as they nursed the sick and therefore may have ingested a high dose with an appreciably greater chance of developing a more severe infection.<sup>92</sup> The role of bed linen and clothing was important, and among the 306 patients in Edinburgh who had certain contact with cholera were twenty-eight nurses and nineteen other women who had developed cholera after washing the bed linen or clothing of cholera sufferers.<sup>93</sup> Christie

suggests that poor nutrition with a consequent decrease in stomach acid allows more organisms to pass into the small intestine and that poorly nourished women may be less able to withstand the physiologic shock of extreme dehydration and electrolyte loss from diarrhoea and vomiting.

The cholera epidemic although relatively small in terms of morbidity and mortality compared to the great fever outbreaks had a disproportionate impact. It was a condition which terrified the populace and encouraged the municipal authorities and the city's essentially conservative medical profession to work together in an organised way for the first time. This change of attitude was remarkable but was only partial it seems: Christison in a letter of 27 August 1849 to his colleague Dr W.P. Alison who at the time was on holiday in Devon wrote that<sup>94</sup> 'though nothing is said of it in the papers, and there are no regular reports, no less than seventy cases of cholera are ascertained to have occurred in Edinburgh since the beginning of August ...so much for the efficiency of the system.' Whether this was the case or not cannot be proven but nonetheless it does suggest that officials were perhaps colluding in efforts to keep the outbreak from the public and a physician as prominent as Christison was prepared to believe that this was so.

This article has shown the misery which was the lot of those who lived in Edinburgh's slums during the middle of the nineteenth century; their lives were blighted by communicable disease against which they had little protection either individually or collectively. By the end of the 1840s, largely as a result of the cholera epidemic, there had developed a semblance of co-operation between doctors and municipal authorities even though a medical officer of health for Edinburgh was not appointed until 1862. Yet strangely despite the dangers of ill health and death there was a steady influx of people hoping to find some form of employment or merely seeking 'the vitality that made the old slums bearable.'<sup>95</sup>

## NOTES AND REFERENCES

- 1 Recent works on the urban environment include *The Cambridge Urban History of Britain, Volume 3: 1840-1850*, (ed) M Daunton, ( Cambridge, 2001) and by contemporary scholars: *The industries of Scotland : their rise, progress and present condition / a reprint of the classic work by David Bremmer*; with a new introduction by John Butt and Ian L. Donnachie. The original was published in 1869. The classic survey is that of J P Kay- Shuttleworth: *The moral and physical condition of the working classes employed in the cotton manufacture in Manchester* , (London, Ridgeway, 1832). Since this paper was read at a meeting of the Old Edinburgh Club, an impressive addition to the historiography of Edinburgh has appeared: Paul Laxton and Richard Rodger, *Insanitary City. Henry Littlejohn and the Condition of Edinburgh*, (Lancaster, Carnegie Publishing, 2013).
- 2 Rebecca Madgin and Richard Rodger, 'Inspiring Capital? Deconstructing myths and reconstructing urban environments, Edinburgh 1860-2010', *Urban History*, 40.3, August 2013, pp 507-529.
- 3 R. Chambers, *Traditions of Edinburgh*, (Edinburgh, 1931), pp. v & viii.
- 4 Sebaldus Naseweis, *Edinburgh and its Society in 1838*, (Edinburgh, 1838). Obviously a pseudonym, Naseweis is a German term used to describe a cheeky or nosey individual.
- 5 J Bruce, *Letters on Destitution and Vice in Edinburgh*, (Edinburgh, 1850); G.H.Martin, 'Introduction' in G.Bell, *Day and Night in the Wynds of Edinburgh and Blackfriars' Wynd Analyzed*, (Edinburgh, 1849 & 1850, new Edition, Wakefield, 1973.), p.vii.
- 6 *Census Enumerators Abstract*, p.1020.
- 7 *Report on the Sanitary Condition of the Labouring of Population of Great Britain* (edited with an introduction by M W Flinn) (1842) and (Edinburgh 1965) pp. 97-99; Southwood Smith and Kay Shuttleworth were both MD Edinburgh and Arnott, born in Arbroath was MD Aberdeen.
- 8 J.Pickstone, 'Dearth, dirt and fever epidemics: rewriting the history of British public health, 1780-1850', in T.Ranger and P.Slack, (eds), *Epidemics and Ideas*, (Cambridge, 1992), pp.125-148.
- 9 Minute Book of Edinburgh Royal Infirmary, No.12, 1838-1842, pp.144 & 282.
- 10 T.McKeown, *The Modern Rise of Population*, London, 1976). McKeown postulated that improved nutrition was the main reason for the increase in population in Britain during the eighteenth and nineteenth centuries.
- 11 A.Hardy, 'Water and the Search for Public Health in London in the Eighteenth and Nineteenth Centuries', *Medical History*, 28, (1984), p.250.
- 12 J. Colston, *The Edinburgh and District Water Supply: A Historical Sketch*, (Edinburgh, 1890), p.42. James Colston (1830-1897) had been a councillor for Newington and City Treasurer in 1870.
- 13 A. Leslie, *An Account of the Water Supply of Edinburgh*, (Edinburgh, 1883), pp.4 & 5.
- 14 Q.J.*The Supply of Water to Edinburgh*, (Edinburgh, n.d.?1851), p.31.
- 15 Q.J.*The Supply of Water to Edinburgh*, p.35.
- 16 Anon, *Case of the Edinburgh Water Company*, (Edinburgh, 1835), p.3.
- 17 A.Ramsay, *Report on Minute of Cleaning Committee of 21 October and Minute of General Board of Commissioners of Police of 10 November 1843*, (Edinburgh, 1843), pp.10 & 11.
- 18 *Evidence before the Parliamentary Committee on the Water Company's Bill*, (Edinburgh, 1843), pp.38 &45.
- 19 R.Rodger, *The Transformation of Edinburgh. Land, Prosperity and Trust in the Nineteenth Century*, (Cambridge, 2001), pp.96 & 358.
- 20 G. Gordon 'The Changing City' in G.Gordon, (ed) *Perspectives of the Scottish City*, (Aberdeen, 1985), p. 3 says that the rate of increase was greater during 1801-1851 than 1851-1911.
- 21 Anon., *An Account of Great Fires*, (Edinburgh, 1824), pp.1-16.
- 22 P.P. *An Act for Carrying into Effect certain Improvements within the City of Edinburgh and adjacent to the same*, 7&8 G.IV, Cap.lxxvi, (1827).
- 23 W.Tait, *An Examination of the Statements contained in the Papers relating to the Fetid Irrigations around the City of Edinburgh*, (Edinburgh, 1839); R. Forsyth, *Foul Burn Agitation Statement* (Edinburgh, 1840); D.Ellis, *Fetid Irrigations*, (Edinburgh, 1840); *Papers relating to the Noxious Effects of Fetid Irrigations*, (Edinburgh, 1840). In Edinburgh Central Library there are also Police Commissioners' Papers relating to Fetid Irrigations.
- 24 Edinburgh Police Commission Cleaning Committee Minute Book, July 1840-September 1844, Minute of Committee on Privies, 30 October 1841, pp. 48 and 174.
- 25 H.D.Littlejohn, *Report on the Sanitary Condition of the City of Edinburgh*, (Edinburgh, 1865), p.27. Littlejohn was appointed as the city's first medical officer of health in 1862.
- 26 A. Hardy, 'Urban famine or Urban crisis? Typhus in the Victorian City', *Medical History*, 32, (1988), p.405; G. Wilson and J. Coghlan, 'Spirochaetal and leptospiral diseases in G. Wilson (ed.). Topley and Wilson's *Principles of Bacteriology, Virology and Immunity*, (London, 1983-84), Volume 3, p.579.
- 27 Edinburgh City Archive, St Cuthbert's Burial Records 1840-1849 and Greyfriars' Burial Register 1835-1842.
- 28 J.Stark, 'Report on the Mortality of Edinburgh and Leith for the Year 1846', *Edinburgh Medical and Surgical Journal*, 67, (1847), pp.620-629. Stark became Scotland's first Superintendent of Statistics in 1855.
- 29 R.Deuchar, *Observations on the Prevalence of Epidemic Fever in Edinburgh and Glasgow; and means suggested for Improving the Sanitary Condition of the Poor*, (Edinburgh, 1844), p.11.
- 30 Edinburgh University Special Collections, Christison Papers, Lectures 1835-36, p.14.
- 31 W.P.Alison, *Observations on the Management of the Poor in Scotland, and its Effects on the Health of the Great Towns*, (Edinburgh, 1840).
- 32 G.M.Howe, *Man, Environment and Disease in Britain: A Medical Geography of Britain through the Ages*, (Harmondsworth, 1972), p.177.
- 33 R. Porter, *The Greatest Benefit to Mankind. A Medical History of Humanity from Antiquity to the Present*, (London, 1999), p.26; B.P.Marmion, 'Rickettsial diseases of man and animals', in G.Smith, (ed.), Topley and Wilson's *Principles of Bacteriology, Virology and Immunity*, (London, 1983-84), volume 3, p. 575; W.H.Parry, *Communicable Diseases*, (London, 1982), p.233.
- 34 E.H.Ackerknecht, *The History and Geography of the Most Important Diseases*, (New York, 1965), p.44; Wilson and Coghlan, 'Spirochaetal and leptospiral diseases', p.524.
- 35 R.Christison, *Address on Public Health*, (Edinburgh, 1863), p.14; W.Jenner, *Typhus Fever, Typhoid Fever, Relapsing Fever*

- and *Febricula, the Diseases commonly confounded under the term Continued Fever*, (London, no date), Lecture 13, p.1; R.Jackson, 'An Account of the Epidemic Fever as observed in Leith, with the Statistical Details of Three Hundred Cases', *Edinburgh Medical and Surgical Journal*, 61, (1844), pp.418 & 425.
- 36 A.Hardy, 'Relapsing Fever', in K.F.Kiple, (ed.), *Cambridge World History of Human Disease*, (Cambridge, 1993), p.967; J.D.Comrie, *History of Scottish Medicine*, (London, 1832), p.509.
- 37 W. Henderson, 'On some of the Characters which distinguish the Fever at present Epidemic from Typhus Fever', *Edinburgh Medical and Surgical Journal*, 61, (1844), p.217.
- 38 Jackson, 'An Account of the Epidemic Fever as observed in Leith, p.418; Christison Papers, Clinical Lectures 1835-36, p.14.
- 39 C. Murchison, *A Treatise on Continued Fevers of Great Britain*, (London, 1862), p.47.
- 40 R. Christison, 'On the Changes in the Constitution of Fevers and Inflammations in Edinburgh during the Last Forty Years', *Edinburgh Medical and Surgical Journal*, 3, (1857-58), pp.15 & 17.
- 41 Edinburgh City Archive, MacLeod Bay D, Bundle 168, Shelf 19, Correspondence relating to cemeteries and burying the poor, 1844-45.
- 42 Stark, 'Report on the Mortality of Edinburgh and Leith for the Year 1846', p.624; Stark, 'Report on the Mortality of Edinburgh and Leith for the Year 1847', p.513; Stark, 'On the Mortality of Edinburgh and Leith for the Year 1848, p.407.
- 43 Stark, 'Report on the Mortality of Edinburgh and Leith for the Year 1846', p.624; Stark, 'Report on the Mortality of Edinburgh and Leith for the Year 1847', p.512; Stark, 'On the Mortality of Edinburgh and Leith for the Year 1848, p.384.
- 44 H.MacDonald, 'Public Health Legislation and Problems in Victorian Edinburgh with special reference to the work of Dr Littlejohn as Medical Officer of Health', unpublished University of Edinburgh PhD Thesis, 1972, pp. 6-7.
- 45 Deuchar, *Observations on the Prevalence of Epidemic Fever*, pp.5 & 6.
- 46 Minute Book of the Cleaning Committee, July 1840-September 1844, 13 September 1843, p.169.
- 47 Minute Book of the Cleaning Committee, September 1844-October 1849, 10 May 1847, pp.182-183.
- 48 Minute Book of the Royal Infirmary, 13, 1842-1844, 20 June 1842.
- 49 Minutes of the Royal Infirmary, 12, 1838-1842, 12, 25 February 1839, p.148.
- 50 Minute Book of the Royal Infirmary, 13, 1842-1844, 27 June 1842.
- 51 In 1841 it was proposed that no person 'be admitted to the privilege and seclusion of the Female Servants' Ward except servants of those who contributed to the Infirmary to the extent of one pound annually.', Minutes of the Managers of the Royal Infirmary, 12, Report for 1841.
- 52 Minute Book of the Royal Infirmary, 13, 1842-1844, 20 June 1842, 10 October 1842, 26 December 1842, 31 December 1842.
- 53 Minute Book of the Royal Infirmary, 13, 1842-1844, 2 January 1843.
- 54 Minutes of the Royal Infirmary, 12, 1838-1842, 25 February 1839, pp.147-148.
- 55 Minutes of the Royal Infirmary, 12, 1838-1842, 12, 14 January 1839, pp.162-163.
- 56 Edinburgh City Archives, St Cuthbert's Churchyard Cash Book.
- 57 Edinburgh University Special Collections, *Annual Reports of the Royal Public Dispensary, 1843-1845*.
- 58 S.Watts, *Epidemics and History: Disease, Power and Imperialism*, (New Haven, Conn., 1997), p.173.
- 59 S.N.De, *Cholera: its Pathology and Pathogenesis*, (Edinburgh, 1961) p.2.
- 60 P.P., Act to Amend the Nuisances Removal and Disease Prevention Act, 1848, 12 and 13 Vict., cap. cxi.1849.
- 61 The Dean of Guild was an *ex officio* member of the council appointed on the recommendation of the Incorporation of the Brethren of the Guildry, an organisation that protected the interests of those who worked in skilled occupations or commercial concerns.
- 62 Minutes of the Royal College of Physicians of Edinburgh, pp.3732-3734, 12 October 1848.
- 63 Letter from Dr Robert Christison, President of the Royal College of Physicians of Edinburgh, to Edwin Chadwick, Member of the General Board of Health, 5 October 1848, recorded in the College Minutes of 12 October 1848.
- 64 *Scotsman*, 12 August 1848.
- 65 R.J.Morris, *Cholera 1832*, (London, 1976), pp.65 & 66.
- 66 *Scotsman*, 20 September 1848, 23 September 1848, 27 September 1848, 30 September 1848 and 4 October 1848.
- 67 C.Creighton, *A History of Epidemics in Britain: from the extinction of the plague to the present time*, vol ii, (London.1891), p.835; *Report of the General of Health on the Epidemic Cholera of 1848 and 1849*, p.9; E.A. Underwood, *The History of Cholera in Great Britain, Proceedings of the Royal Society of Medicine.*, 41, (1948), p.168 says that the infection 'seems to have been conveyed from Hamburg.'
- 68 Morris, *Cholera 1832*, p.202.
- 69 *Report of the General Board of Health on the Epidemic Cholera*, pp.34-40.
- 70 A.B.Christie, *Infectious Diseases: Epidemiology and Clinical Practice*, (Edinburgh, 1980), p.128.
- 71 Christie, *Infectious Diseases*, p.129.
- 72 Christie, *Infectious Diseases*, p.130; T.P.Pesigan, 'Studies on the Viability of El Tor Vibrios in Contaminated Foodstuffs, Fomites, and Water', *Proceedings of the Cholera Research Symposium*, (Washington, 1965), pp.317-321.
- 73 R. Pollitzer, *Cholera*, (Geneva, 1959), p.846.
- 74 S.C.Szu, R.Gupta and J.B.Robbins, 'Induction of Serum Vibriocidal Antibodies by O-Specific Polysaccharide-Protein Conjugate Vaccines for Prevention of Cholera' in I.K. Wachsmuth, P.A.Blake and Ö.Olsvik, (eds.), *Vibrio cholerae and Cholera: Molecular to Global Perspectives*, (Washington, 1994), p.382; Christie, *Infectious Diseases*, pp.131-132.
- 75 Christie, *Infectious Diseases*, p.132.
- 76 *Scotsman*, 7 October 1848.
- 77 *Scotsman*, 11 October 1848.
- 78 Edinburgh City Archive, Minutes of the Cleaning Committee, 1844-49, 14 October 1848, p.232.
- 79 Minutes of the Cleaning Committee, 1844-49, 6 November 1848, pp.238-243; 8 November 1848, pp.244-245.
- 80 Minutes of the Cleaning Committee, 1844-49, 19 January 1849, pp.253-254 & 271.
- 81 Royal College of Physicians of Edinburgh, Letter from Christison to Chadwick, 5 October, 1848.
- 82 Royal College of Physicians of Edinburgh, Letter from R.Christison, 15 March 1832 in Cholera Correspondence, Moir Papers.
- 83 Daily returns of cholera cases to the committee of the Royal College of Physicians of Edinburgh, November 1848 to November 1849.
- 84 Creighton, *A History of Epidemics in Britain*, pp.835 & 836.
- 85 P.P., Report of the General Board of Health on the Epidemic

BOOK OF THE OLD EDINBURGH CLUB

- Cholera of 1848 and 1849, 1850, [1273.] [1274.] [1275.]  
xxi.3.185.365—1853[1523.] xxi. p.11.
- 86 Edinburgh City Archive, St Cuthbert's Churchyard Cash Book, 1847–1854.
- 87 Pollitzer, *Cholera*, p.745.
- 88 P.P., *Report of the General Board of Health on the Epidemic Cholera of 1848 and 1849*, (1850), p.30; Cholera Returns Royal College of Physicians of Edinburgh 1848-49.
- 89 Edinburgh City Archive, Minutes of the Cleaning Committee, 1844–49, 19 January 1849, pp.260–263. This was the first time that the Committee was described as the Sanitary Committee.
- 90 Royal College of Physicians: Cholera Returns.
- 91 Christie, *Infectious Diseases*, p.131.
- 92 R.Tauxe, P.Blake, Ø. Olsvik, and I.K.Wachsmuth, 'The Future of Cholera: Persistence, Change, and an Expanding Research Agenda' in I.K.Wachsmuth, P.A.Blake and Ø.Olsvik, (eds.), *Vibrio cholerae and Cholera: Molecular to Global Perspectives*, (Washington, 1994), p.450.
- 93 Pollitzer, *Cholera*, pp.846 & 863.
- 94 Royal College of Physicians of Edinburgh Archives, AWP/6/8. Letter from R Christison to W P Alison, 27 August 1849.
- 95 I.H.Adams, *The Making of Urban Scotland*, (Montreal, 1978), p.182.