



# *Scottish Smallpox*

*Enlightenment Medicine and the Fight*

*Against Smallpox in Scotland*

*1750-1850*

*Amanda Seyerle*

# **SCOTTISH SMALLPOX**

## **ENLIGHTENMENT MEDICINE AND THE FIGHT AGAINST SMALLPOX IN SCOTLAND 1750-1850**

Amanda Seyerle

A thesis submitted in partial fulfillment of  
the requirements for the degree of

**BACHELOR OF SCIENCE WITH HONORS**

DEPARTMENT OF HISTORY

UNIVERSITY OF MICHIGAN

March 30, 2011

Advised by Professor Joel Howell and Professor Michael MacDonald

*For my family (Mon, Dad, Missy, and Megan), along with my fellow history honors students  
who helped to keep me sane during this incredible but demanding experience*

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## ACKNOWLEDGEMENTS

This thesis has been an incredible journey and an amazing culmination to my undergraduate career. However, it would not have been possible without the help of many people. The first of these are my thesis advisors, Professor Joel Howell and Professor Michael MacDonald who provided excellent feedback on my writing and important help as I narrowed down my research question and began working with the sources. Their knowledge was invaluable as I searched for primary and secondary sources.

My trip to Britain to access the archives in London and Edinburgh was possible because of the financial support of the University of Michigan History Department and Honors Office. I wish to thank Mr. and Mrs. Jerome Fine and the Grossman Family for providing funding for grants from the Honors Office and History Department, respectively, funds which enabled me to travel to Britain for research. Furthermore, I need to thank my parents, Don and Debbie Seyerle, for supplying the additional funds I needed to complete my trip. Additionally, I am grateful to the staff at the University of Edinburgh's Centre for Research Collections and the Wellcome Library for aiding me with my research.

Several people were exceptionally helpful during the writing process. In addition to my advisors, I need to thank my HISTORY 399 writing group and fellow students, who allowed me to bounce ideas and problems off of them. I want to especially thank Elaine LaFay, who consistently read and critiqued my work. My mom also deserves a special thanks, for serving as my final copy editor as I prepared to send this thesis to the printers.

Finally, I am very grateful to my parents, my sisters, and my friends, who endured over a year of my constant chatter about smallpox, Scotland, and eighteenth century type-font. They put up with me during this insane period and for that, I am thankful.

To all these individuals and the many more who impacted this work, I wish to say thank you. Without them, this would not have been possible.

## INTRODUCTION

### STUDYING THE MOST TERRIBLE OF ALL MINISTERS OF DEATH

#### UPON THE DEATH OF LORD HASTINGS

Was there no milder way but the small-pox,  
The very filthiness of Pandora's box?  
So many spots, like næves, our Venus soil?  
One jewel set off with so many a foil;  
Blisters with pride swelled, which through's flesh did sprout  
Like rosebuds, stuck i' the lily-skin about.  
Each little pimple had a tear in it,  
To wail the fault its rising did commit;  
Which, rebel-like, with its own lord at strife,  
Thus made an insurrection 'gainst his life.  
Or were these gems sent to adorn his skin,  
The cabinet of a richer soul within?  
No comet need foretell his change drew on,  
Whose corpse might seem a constellation.  
Oh had he died of old, how great a strife  
Had been, who from his death should draw their life;  
Who should, by one rich draught, become whate'er  
Seneca, Cato, Numa, Cæsar, were!  
Learned, virtuous, pious, great; and have by this  
An universal metempsychosis.  
Must all these aged sires in one funeral  
Expire? all die in one so young, so small?  
Who, had he lived his life out, his great fame  
Had swoln 'bove any Greek or Roman name.  
But hasty winter, with one blast, hath brought  
The hopes of autumn, summer, spring, to nought.  
Thus fades the oak i' the sprig, i' the blade the corn;  
Thus without young, this Phœnix dies, newborn.  
John Dryden, 1631-1700<sup>1</sup>

On June 24, 1649, Henry, Lord Hastings, the only son of the sixth Earl of Huntingdon in England died after suffering a severe case of the smallpox.<sup>2,3</sup> John Dryden's poem "Upon the Death

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<sup>1</sup> John Dryden, "Upon the Death of Lord Hastings", in *The works of John Dryden (1882-1892)*, Vol XI: Elegies and Epitaphs, (Edinburgh, 1882-1892), printed by William Paterson, English Poetry Database, University of Michigan, (accessed November 3, 2010), 96.



of Lord Hastings” laments the death of this prominent man in English society, using language which evokes an image of a repulsive disease that came in and quickly swept away the Lord Hastings in the prime of his life. The imagery in Dryden’s poem is often gruesome. “The very filthiness of Pandora’s box?” “Blisters with pride swelled, which through’s flesh did sprout.” “How great a strife/Had been, who from his death should draw their life.”<sup>4</sup> Through these images, modern historians can understand how great the fear surrounding this dreaded disease was for the early modern European. Dryden portrays a man in his prime whose hopes in life were extinguished by one of the worst paths to death, asking “Was there no milder way but the small-pox...?”<sup>5</sup>

Lord Thomas Macaulay, a prominent nineteenth century British historian, called smallpox “the most terrible of all ministers of death.”<sup>6</sup> His description mimics that found in John Dryden’s poem. Smallpox terrified the world for over three thousand years and Macaulay and Dryden’s comments provide only a small insight into the impact this disease had on the world. While smallpox has been completely eradicated from the human population in the centuries since Dryden and Macaulay were witnessing its damage, its imprint upon history cannot be erased so easily.

In Britain, smallpox is particularly interesting, as the British Isles were the home of a significant portion of European medical innovation in the eighteenth century, including the introduction of smallpox inoculation into Europe,<sup>7</sup> the discovery of vaccination,<sup>8</sup> and the leading medical school in Europe – the Medical School at the University of Edinburgh. While England’s experience with the disease has been intensely studied, the experience of Scotland remains

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<sup>2</sup> Rev. Thomas Corser, M.S., F.S.A., *Collectanea Anglo-Poetica: or, A Bibliographical and Descriptive Catalogue of a Portion of a Collection of Early English Poetry, with Occasional Extracts and Remarks Biographical and Critical*, Part III, (1867), Printed for the Chetham Society, Google Books, (accessed November 3, 2010), 119.

<sup>3</sup> Raymond A. Anselment, “Smallpox in Seventeenth-Century English Literature: Reality and the Metamorphosis of Wit,” in *Medical History*, 33, (1989), 72.

<sup>4</sup> Dryden, 96.

<sup>5</sup> Dryden, 96.

<sup>6</sup> Donald R. Hopkins, *Princes and Peasants: Smallpox in History*, (University of Chicago Press, 1983), 38.

<sup>7</sup> See page 63 for further information.

<sup>8</sup> See page 77 for further information.

understudied. Despite this, Scotland has played an important role in the elimination of the disease and deserves further scrutiny. Examining how Scotland responded to medical innovation and how the medical community sought to educate the general populace has potential implications for the modern-day spread of medical innovation and disease prevention techniques among an often medically illiterate population.

### **WHAT IS SMALLPOX**

John Dryden's description of smallpox in his poem "Upon the Death of Lord Hastings" provides a beautiful description of an ugly disease. In the early modern period, smallpox was a killer on a massive scale. It was a universal killer and deaths due to smallpox could be found in the privilege of the royal courts or in the desperation of the lowest of village slums. At the height of its power, smallpox caused as much as ten percent of all deaths in Europe, deaths which included eleven members of the Habsburg family of Austria and six members of the Stuart family tree of Britain.<sup>9,10</sup> By the start of the eighteenth century, smallpox had become the most prevalent pestilence in Europe and, according to a German proverb, "From love and smallpox but few remain free."<sup>11</sup>

It is helpful to have knowledge of the modern perception of smallpox before studying how historical generations saw the disease, if only to understand better how we got to where we are in medicine, what the major differences are between our modern comprehension of disease and the eighteenth century view of disease, and what modern prejudices a twenty-first century reader may need to shed in order to better perceive the field of medicine in Enlightenment Scotland.

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<sup>9</sup> Nicolau Barquet and Pere Domingo, "Smallpox: The Triumph over the Most Terrible of the Ministers of Death," in *Annals of Internal Medicine*, 127(8-1), (October 15, 1997), 636.

<sup>10</sup> Hopkins, 40, 45.

<sup>11</sup> Hopkin, 32.

Smallpox is a viral disease which is unique to the human population. It's source is the variola virus, which comes from the same family of viruses as the cowpox virus and the monkeypox virus.<sup>12</sup> The variola virus could be found in four forms. The two most common forms were the variola major and the variola minor. The variola major was more severe and had a thirty percent fatality rate while the variola minor was milder and had less than one percent fatality. Ordinary presentation of the variola major and the variola minor viruses accounted for ninety percent of all smallpox cases.<sup>13</sup> The remaining ten percent were caused by the two rare forms: the haemorrhagic smallpox and the malignant smallpox. The haemorrhagic form was accompanied by significant bleeding of the mucous membranes, and the malignant form was defined by incomplete development of the characteristic smallpox pustules. Both rare forms were nearly always fatal..<sup>14</sup>

Once infected, a smallpox patient often went as much as two weeks before presenting symptoms. The initial symptoms of smallpox, which began after the incubation period of one to two weeks, commenced with influenza-like symptoms, including fever, headache, chills, nausea, backache, and delirium.<sup>15</sup> Two to four days after the initial presentation, the fever subsided and the characteristic rash appeared.<sup>16</sup> The classic rash concentrates on the face and extremities.<sup>17</sup> In naturally acquired smallpox, fever spiked a second time before both the rash and fever slowly subsided over approximately a week.<sup>18</sup> Inoculated smallpox resulted in a shorter and less severe infection but also resulted in a rash and two separate fever spikes. Vaccination, however, does not

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<sup>12</sup> F. Fenner, D.A. Henderson, I. Arita, Z. Jezek, and I.D. Ladnyi, *Smallpox and its Eradication*, (Geneva: World Health Organization, 1988), 73.

<sup>13</sup> W. Atkinson, J. Hamborsky, L. McIntyre, S. Wolfe, ed., "Smallpox," in *Epidemiology and Prevention of Vaccine-Preventable Diseases (The Pink Book)*, 9<sup>th</sup> ed., (Washington DC: Public Health Foundation, 2005), [www.cdc.gov/vaccines/pubs/pinkbook](http://www.cdc.gov/vaccines/pubs/pinkbook), (accessed March 23, 2011), 283.

<sup>14</sup> "Smallpox Fact Sheet," World Health Organization Media Centre, <http://www.who.int/mediacentre/factsheets/smallpox/en/index.html>, (accessed March 20, 2011).

<sup>15</sup> Hopkins, 4.

<sup>16</sup> Barquet, 636.

<sup>17</sup> F. Fenner, *et.al.*, 21.

<sup>18</sup> F. Fenner, *et.al.*, 41.

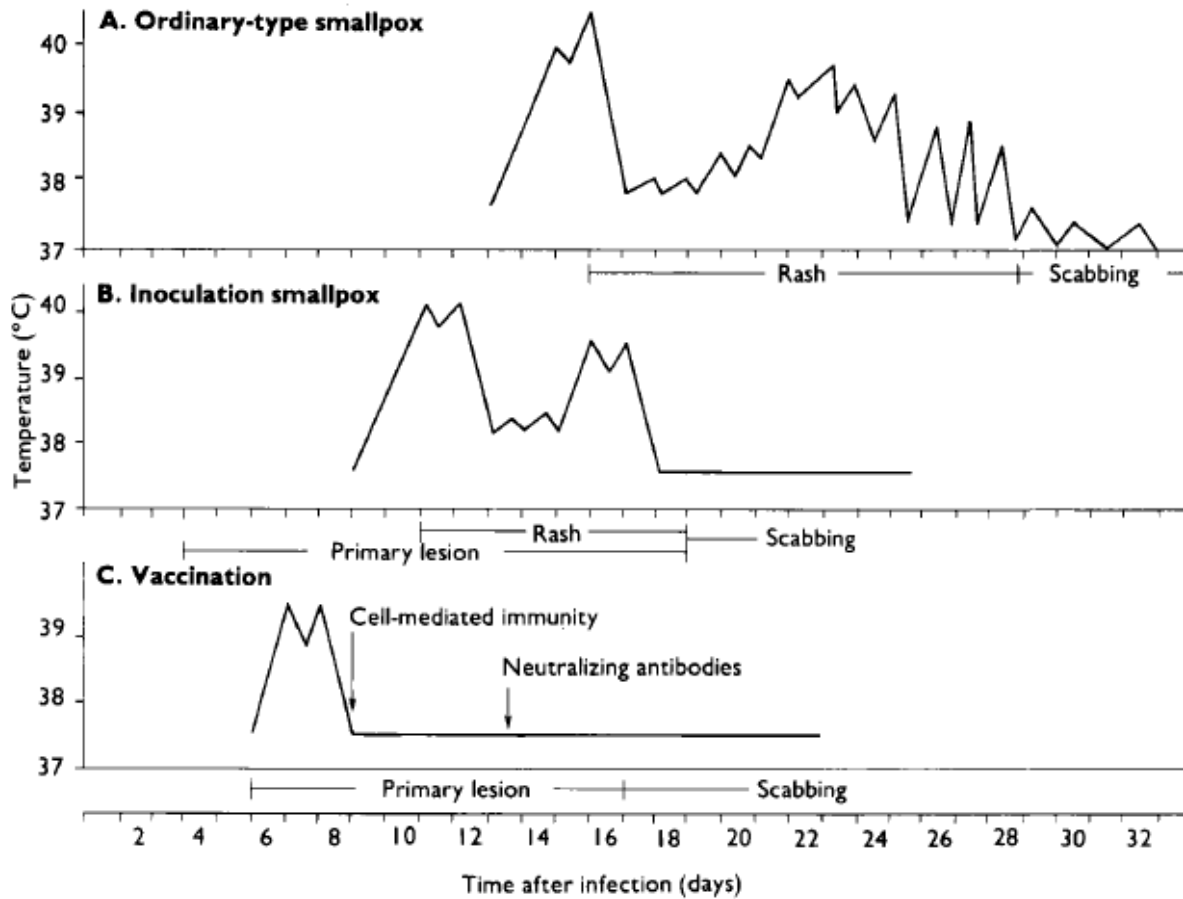


Figure I-1: Clinical course of (A) the natural smallpox, (B) the inoculated smallpox, and (C) Vaccination with vaccinia virus (relative of smallpox and cowpox)<sup>19</sup>

present a rash but rather a single lesion with a small fever (See Figure I-1).<sup>20</sup> It is during the initial fever spike and the initial development of the rash when smallpox sufferers are most contagious.<sup>21</sup> Because of this, variola minor was much easier to spread, as patients suffering from variola major were often bedridden throughout their disease whereas patients suffering from variola minor were much more mobile and able to spread the disease to a much wider audience.<sup>22</sup> Despite this impediment in spreading variola major, this virus has caused many epidemics throughout history

<sup>19</sup> F. Fenner, *et.al.*, 41.

<sup>20</sup> F. Fenner, *et.al.*, 41.

<sup>21</sup> "Smallpox Fact Sheet".

<sup>22</sup> "Smallpox Fact Sheet".

and accounts for a significant percentage of the deaths which made smallpox one of the most virulent killers in history.

### ***HISTORIOGRAPHY***

The body of historical work on smallpox in Scotland can be split into two categories: work on smallpox and work on Scotland. There has been very little overlap between these fields. Work on smallpox concentrates on smallpox's impact on humanity and society as well as on its impact on science, particularly population statistics or human demography. Relevant work on Scotland in this period commonly studies the impact of the Enlightenment on the publication industry and Scotland's rising literacy as well as on the prominence of Scotland's medical community.

After the eradication of smallpox, historical scholarship emerged rapidly. The production of work on diseases has continued as the era of bioterrorism has taken hold and the threat of smallpox has once again become a frightening possibility. A reason for society's fascination with smallpox arises from the incredible impact it has had on society. As Donald R. Hopkins argues in his book *Princes and Peasants: Smallpox in History*, a book which follows the progression of smallpox through history, from its first appearance to its eradication, smallpox has been a force of change throughout history and across all corners of the globe due to its long and destructive period of prevalence among the populations of the world. It has even had a lasting political impact as it carried off the ruling elites of the world.<sup>23</sup> Attempts have been made to quantify this impact. Susan Scott and Christopher J. Duncan compare smallpox disease patterns with economic factors, demography, location, and time, arguing that the oscillations in mortality caused by regular smallpox epidemics have an indelible impact on history as well as the indicating the close ties between smallpox and the

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<sup>23</sup> Hopkins, xvi.

oscillations in economic prosperity and migration throughout history.<sup>24</sup> Scott and Duncan also point out the similarities between eighteenth century dynamics in Europe and modern undeveloped countries, where infectious diseases pose a health crisis and fighting infectious diseases in these countries pose many of the same potential problems as those developed by early modern communities. Understanding how the medical community was able to persuade the general populace to accept the many changes in the field of medicine despite their numerous prejudices and often lack of knowledge or education, a theme which is deeply woven into this thesis, presents an important set of considerations for the modern treatment of infectious disease.

The influence of smallpox on other fields of science is another common topic in the literature. Andrea Rusnock's book, *Vital Accounts: Quantifying Health and Population in Eighteenth Century England and France*, argues that smallpox had a prominent role in the development of public health in the eighteenth century. Furthermore, Rusnock argues that smallpox was an essential step in the development of population statistics, pointing out the use of population statistics to understand smallpox "encouraged a similar approach in other areas of medicine."<sup>25</sup> John M. Eyles's article "Smallpox in history: The birth, death, and impact of a dread disease," similarly argues that smallpox has left an undeniable imprint upon history. Eyles maintains that smallpox has had both a global impact on population structure and dynamics but he also states that smallpox has served as the impetus for many great medical advances including an analogy put forth by William Budd which argued that typhoid fever was marked by a similar lesion as that of smallpox and therefore must also be contagious, an analogy which eventually led to the discovery that

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<sup>24</sup> Susan Scott and Christopher J. Duncan, *Human Demography and Disease*, (Cambridge University Press, 1998), 9.

<sup>25</sup> Andrea A. Rusnock, *Vital Accounts: Quantifying Health and Population in Eighteenth-Century England and France*, (Cambridge University Press, 2002), 106.

typhoid fever was waterborne.<sup>26</sup> The impact of smallpox on medical innovation, including the close links between population statistics and smallpox, proves a fascinating study in Scotland but one that has been neglected in the literature.

While the research on smallpox affords very little attention to Scotland, Enlightenment Scotland has received significant attention. Enlightenment Scotland was an important and vibrant country in the eighteenth century. Mary Cosh calls Enlightenment Edinburgh “Modern Athens in full flower.”<sup>27</sup> Furthermore, R.A. Houston studies literacy and education in Scotland during the periods surrounding the Enlightenment. According to his study *Scottish Literacy and the Scottish Identity: Illiteracy and Society in Scotland and Northern England, 1600-1800*, literacy and education in eighteenth century Scotland was far above that of other European countries and even above England, despite the tight links between the two countries’ governments.<sup>28</sup> The advances in education and Enlightenment thought in eighteenth century Scotland enabled the spread of medical ideas and provided the Scottish population with access to these ideas, a theme which is central to the work of this study.

Despite the disparity between work on smallpox and work on Scotland, there is a great deal of study devoted to medicine in Scotland. Margaret DeLacy’s work on influenza, entitled “Influenza Research and the Medical Profession in Eighteenth-Century Britain,” argues that the medical curriculum at the Medical School at the University of Edinburgh stood at the forefront of the field and Edinburgh gained a considerable reputation in the medical sciences during the eighteenth century.<sup>29</sup> However, perhaps one of the most important arguments on Enlightenment medicine in

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<sup>26</sup> John M. Eyler, “Smallpox in history: The birth, death, and impact of a dread disease,” in *Journal of Laboratory and Clinical Medicine*, 142(4), (October 2003), 219.

<sup>27</sup> Mary Cosh, *Edinburgh: The Golden Age*, (Edinburgh: John Donald Publishers, 2003), ix.

<sup>28</sup> R.A. Houston, *Scottish Literacy and the Scottish Identity: Illiteracy and Society in Scotland and Northern England, 1600-1800*, (Cambridge University Press, 1985), 8.

<sup>29</sup> Margaret DeLacy, “Influenza Research and the Medical Profession in Eighteenth-Century Britain,” in *Albion: A Quarterly Journal Concerned with British Studies*, 25(1), (1993), 40.

Scotland comes from Guenter B. Risse. In his book *Hospital Life in Enlightenment Scotland*, Risse argues that the “state of the medical art” in Scotland can be reflected in the founding of the Royal Infirmary of Edinburgh which was “an important factor in the conscious drive toward modernity and national achievement fueled by the Scottish Enlightenment.”<sup>30</sup> By expanding upon the prominence of the medical field in eighteenth century Edinburgh to include a study of smallpox, this thesis provides a way to unite the deadliest disease of the eighteenth century with the country at the forefront of the medical arts.

### ***A NEW LOOK AT SCOTLAND***

Little of the body of historical literature has expanded upon smallpox outside of the several most popular regions of study: England, France, and the Americas. In the historiography, Scotland has remained neglected. One exception to this is Deborah Brunton’s article “Smallpox Inoculation and Demographic Trends in Eighteenth-Century Scotland.” In her article, Brunton argues that extrapolating the data found in England to include the whole of the British Isles is a mistake, saying that Scotland must receive its own attention.<sup>31</sup> Based on Brunton’s assertion that the data from England cannot be extrapolated to include Scotland, the work of this thesis will attempt to unravel the story of Scotland from that of England. How did the characteristics of the Scottish Enlightenment affect the medical community’s views of smallpox? Who composed the Scottish medical community and how did they converse with the Scottish populace? How did these factors culminate in the debates surrounding inoculation and vaccination policy?

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<sup>30</sup> Guenter Risse, *Hospital Life in Enlightenment Scotland: Care and Teaching at the Royal Infirmary of Edinburgh*, (Cambridge University Press, 1986), 3-6.

<sup>31</sup> Deborah Brunton, “Smallpox Inoculation and Demographic Trends in Eighteenth-Century Scotland,” in *Medical History*, 36, (1992), 425.



The ultimate theme of this thesis is to examine the two major impacts of the Scottish Enlightenment on medical treatment. The first of these was the Enlightenment's emphasis on the production of literature which enabled the spread of knowledge throughout both the medical and non-medical communities. The second impact is the Enlightenment's encouragement of the breakdown and classification of both diseases and their treatments, including a better understanding of the underlying causes of the disease and the experimental and experiential proof of the treatments. This study allows the modern historian to gain a stronger understanding of who responded to disease, how they responded, and what was most important in their considerations when treating illnesses.

Given the prominence of smallpox and its deadly consequences in the period of the Enlightenment, this disease provides an excellent case-study for the medical community in Enlightenment and Post-Enlightenment Scotland. Furthermore, Scotland's prominence in the medical field at the end of the eighteenth century and its international influence allow Scotland to serve as a basis for a broader understanding of Western medicine in the eighteenth and nineteenth centuries, a relationship which is formed when the theories which appeared in Scotland came from abroad or when the theories which originated in Scotland travelled abroad to influence both European and American medicine. And so this work will attempt to finally capture the experience of the Scottish smallpox and its importance within the historical framework of the Scottish Enlightenment.

## CHAPTER ONE

### ENLIGHTENMENT SCOTLAND AND THE SEARCH FOR A CAUSE

Eighteenth century Scotland was a country with untapped potential. In the century following the 1707 Act of Union between England and Scotland, a period now known as the Scottish Enlightenment, intellectual ideas and culture flourished. Scottish architecture and art exploded. Literature, already a burgeoning field in Scotland, expanded even further. A Scottish education became a sought after experience in Britain, even achieving acclaim among a broader European audience. Arguably, the best representations of intellectual discovery can be found in the written publications that came out of Scotland. Covering a vast array of subjects, Edinburgh published the greatest number of books in Britain outside of London and Glasgow published the fourth largest number in Britain, falling just behind Oxford.<sup>1</sup>

The exponential expansion of knowledge and intellectual curiosity had a prominent impact on the medical field. Over the course of the eighteenth century, the Medical School at the University of Edinburgh became the foremost authority in Britain for medical knowledge and training and became one of the most sought after medical educations in all of Europe.<sup>2,3</sup> By the 1760s, the University of Edinburgh's reputation had become so widespread that it was common for colonists from the Americas to come to Scotland to study medicine.<sup>4</sup> Scientific advancements of the

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<sup>1</sup> R.A. Houston and W.W.J. Knox, *The New Penguin History of Scotland: From the Earliest Times to the Present Day*, (New York: Allen Lang The Penguin Press, 2001), 328.

<sup>2</sup> Margaret DeLacy, "Influenza Research and the Medical Profession in Eighteenth-Century Britain," in *Albion: A Quarterly Journal Concerned with British Studies*, 25(1), (1993), 40.

<sup>3</sup> Guenter Risse, *Hospital Life in Enlightenment Scotland: Care and Teaching at the Royal Infirmary of Edinburgh*, (Cambridge University Press, 1986), 2.

<sup>4</sup> Mary Cosh, *Edinburgh: The Golden Age*, (Edinburgh: John Donald Publishers, 2003), 68.

Scottish Enlightenment brought Scottish medicine and medical education to the forefront of the field.

However, in many aspects, Scotland continued to struggle with its past. Despite the medical advancements of the eighteenth century, diseases continued to terrorize populations. For centuries, the bubonic plague had decimated the British Isles but in the 1640s, the plague disappeared from Scotland.<sup>5</sup> However, rather than rejoicing in the end of this crisis, inhabitants of Scotland were immediately faced with a new threat: the deadly smallpox. While smallpox had likely been first introduced to the British Isles in the thirteenth century,<sup>6</sup> by the eighteenth century, it had become a virulent killer and, in the whole of Europe, smallpox killed more people than any other disease.<sup>7</sup> Further adding to their struggles, life in Scotland was difficult and wealth was scarce. As the Scots faced the threat of smallpox, they began to put their evolving knowledge, which developed during the Enlightenment, along with the determination which allowed them to survive a harsh Scottish life, to the test in order to prevent the destruction of their populace.

### ***GEOGRAPHY AND DEMOGRAPHY OF SCOTLAND***

While many historians study British history as a whole, the demography of Scotland made it a very different place from England and Wales. This difference starts in the physical geography of Scotland (see Figure 1-1). The physical geography – as well as Scottish culture and identities – are traditionally divided into two regions: the Lowlands and the Highlands. The Lowlands are also sometimes further divided into the Southern Uplands and the Central Lowlands. The Southern Uplands represent the southern-most part of Scotland and is composed of rolling hills and fertile

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<sup>5</sup> Houston and Knox, 281.

<sup>6</sup> Donald R. Hopkins, *Princes and Peasants: Smallpox in History*, (University of Chicago Press, 1983), 27.

<sup>7</sup> Allan Everett Marble, *Surgeons, Smallpox, and the Poor: A History of Medicine and Social Conditions in Nova Scotia, 1749-1799*, (McGill-Queen's University Press, 1993), Google Books, (accessed December 7, 2010), 7.



Figure 1-1: Physical Map of Scotland<sup>8</sup>

land. This geography is similar to that of the Central Lowlands; however, the Central Lowlands is also home to the majority of the Scottish population and is the location of both Glasgow and

<sup>8</sup> Physical Map of Scotland, *Free World Maps*, <http://www.freeworldmaps.net/europe/united-kingdom/scotland/map.html>, (accessed December 17, 2001).

Edinburgh, Scotland's two largest cities.<sup>9</sup> This region is separated from the Highlands by the Highland Fault. The Highlands are rugged compared to the Lowlands. This region contains a mix of rocky soil, high cliffs, tall mountains, and peaceful lochs. The mountains of the region are home to the highest elevation of the British Isles, Ben Nevis, which stands at 4,406 feet.<sup>10</sup> Further adding to Scotland's striking geography are the 720 islands located around the mainland, islands which are just as varied as the central part of Scotland.

This variation in geography is further expanded by a varied climate. High elevations receive large amounts of snow while low-lying areas receive little to none. Similarly, rain totals vary drastically, with areas around Ben Nevis receiving as much as 142 inches annually and areas in the east receiving almost six times less.<sup>11</sup> In general, Scotland's climate is cloudy and cooler than that of England, although milder than that of other countries at similar altitudes.

While the geography of the Lowlands may be similar to that of England, the Highlands are a different land and it is the combination of these two regions which create important relationships between the Highlanders and Lowlanders of Scotland. Life in the Highlands was difficult and it was common for Highlanders to look to the Lowlands for employment. In the seventeenth and eighteenth century, this often led to seasonal migration to the Lowlands, where Highlanders would travel to the Lowlands to work in the increasing number of manufacturing jobs and then return to the Highlands with their earnings.

During the latter half of the eighteenth century, Scotland witnessed a rapid urbanization. This urbanization caused Scotland to jump from having only ten percent of its population urbanized in 1750 to being one of the top five most urbanized countries in Western Europe by 1800. From

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<sup>9</sup> "Scotland's landscapes," *VisitScotland.com*, <http://www.visitscotland.com/guide/scotland-factfile/geography/landscapes>, (accessed December 17, 2010).

<sup>10</sup> "Scotland," in "Travel and Geography," *Encyclopedia Britannicaeb.com*, <http://www.britannica.com/EBchecked/topic/529440/Scotland>, (accessed December 17, 2010).

<sup>11</sup> *Encyclopedia Britannicaeb.com*.

here, it advanced even farther, to being the second most urbanized society, behind only England and Wales.<sup>12</sup> Sir John Sinclair's *Statistical Account of Scotland*<sup>13</sup> analyzes the urban population of Scotland at the end of the eighteenth century. Sinclair calculates that the populations of all towns and cities in Scotland with more than 300 people to be 645,725. Given Sinclair's calculation that the overall population of Scotland is 1,527,892, this leaves 882,167 inhabitants in rural areas.<sup>14</sup> These numbers show that by 1800, 42.3 percent of Scotland was urbanized, a large amount when it is considered that most urban centers were in the Lowlands, an area which accounted for only a third of Scotland's landmass.

Much of this urbanization came as Highlanders moved south to Lowland towns and cities. Many who had once been part of the seasonal migration from the Highlands to the Lowlands now made more permanent moves to Lowland urban centers in search of work and income. One demonstration of this shift in the population of Scotland comes from the proportion of the population which could be found in the two regions. According to data found in the *Old Statistical Account*, in 1755, the population in the Lowlands was 649,855 (51.4 percent) while that of the Highlands was 613,530 (48.6 percent).<sup>15</sup> By 1801, the population of the Lowlands had reached 935,276 (57.1 percent) and the Highlands had a population of 703,563 (42.9 percent).<sup>16</sup> This is an increase of 285,421 people in the Lowlands while the population in the Highlands only rose by 90,033. However, by 1850, when the process of urbanization had peaked, only 26.4 percent of the

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<sup>12</sup> Houston and Knox, 282.

<sup>13</sup> Sir John Sinclair's *Statistical Account of Scotland*, now known as the *Old Statistical Account of Scotland*, was a document compiled by Sinclair in the 1790s. Sinclair sent questionnaires to the ministers of the 938 parishes in Scotland, asking about population, disease, economy, and geography. The responses were compiled into the *Statistical Account*, a document which has served as the first census in Scotland.

<sup>14</sup> Sir John Sinclair, *The Statistical Account of Scotland, 1791-1799*, Vol. 1, (East Ardsley, Wakefield: EP Publishing Limited, 1983), 148.

<sup>15</sup> Sinclair, Vol. 1, xliii-xlv.

<sup>16</sup> Sinclair, Vol. 1, xliii-xlv.

population remained in the Highlands and the proportion of the population in the Lowlands had reached 73.6 percent.<sup>17</sup>

Contemporary Scots understood that their population was shifting and wrote about their observations. In the Parish of Inch, which was located in Aberdeen,<sup>18</sup> the parish minister wrote about the population changes in his response in the *Old Statistical Account*. He stated that:

The population of this parish has decreased within these 40 years. In Dr. Webster's account it is stated at 995; it is now only 900, or 95 less. The population of the country parishes in the north of Scotland has decreased much in the end of the last century, as may be seen, by comparing the numbers who paid the poll-tax, (a number certainly short of the whole population), with the numbers given in Dr. Webster's account... the scarcity of moss in country parishes, and the demand for labour about towns on the sea coast, drew off a number of people to reside in the royal boroughs, or manufacturing towns. It is now chiefly in those parishes, in which manufacturing villages are found, that the population is increasing.<sup>19</sup>

The minister of Inch has seen that the north of Scotland cannot sustain its population, which is forcing Highlanders to move to the Lowland towns where manufacturing jobs were more plentiful and they could make a living. Using Dr. Alexander Webster's work<sup>20,21</sup> as a baseline for the Highland's population prior to the period of rapid urbanization, the minister of Inch describes the phenomena that much of the Highlands witnessed by the start of the nineteenth century, as urbanization and a better chance to earn a living drew the Highlanders south.

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<sup>17</sup> Michael Flinn, Judith Gillespie, Nancy Hill, Ailsa Maxwell, Rosalind Mitchison, and Christopher Smout, contributions from Duncan Adamson and Robin Lobban, ed. by Michael Flinn, *Scottish Population History: from the 17<sup>th</sup> century to the 1930s*, (Cambridge University Press, 1977), 306.

<sup>18</sup> See Figure 1-2

<sup>19</sup> Sir John Sinclair, *The Statistical Account of Scotland. Drawn Up From the Communications of the Ministers of the Different Parishes*, Vol. 17, (Edinburgh, 1796), printed for William Creech, Google Books, (accessed December 10, 2010), 485-486.

<sup>20</sup> Alexander Webster was an influential Scotsman in the eighteenth century (born 1707, died 1783) who studied at Edinburgh University and wrote *Account of the Number of People in Scotland in the Year 1755* which provides the population of each of 892 parishes and is the precursor of the *Old Statistical Account* which began in 1790 (see footnote 17).

<sup>21</sup> A.J. Youngson, "Alexander Webster and his 'Account of the Number of People in Scotland in the Year 1755,'" in *Population Studies*, 15(2), (November 1961), 198.



Table 1-2: Counties of Scotland<sup>22</sup>

<sup>22</sup> Herman Moll, *Scotland divided into its Shires* / by H. Moll, (London: Bowles and Bowles, 1745), "Maps of Scotland, 1560-1928," National Library of Scotland, EMS.b.2.1/2, <http://maps.nls.uk/scotland/detail.cfm?id=163>, (accessed December 19, 2010).



## ***MEDICAL AND INTELLECTUAL SCOTLAND***

During the period of urbanization, Scotland also experienced a period of intellectual achievement. Eighteenth century Scotland produced an impressive amount of Enlightenment knowledge, knowledge which was both varied and innovative. In 1776, the eminent Scotsman Adam Smith published *The Wealth of Nations*, which has served as a prominent book in free market economics and maintains this status today. The Reverend Doctor William Robertson served as a “central figure” of the Scottish Enlightenment, serving as a historian, theologian, and the head of the University of Edinburgh during his distinguished career.<sup>23</sup> Adam Ferguson was a great Scottish thinker who promoted political participation as an element of liberty and is often seen as the father of modern sociology.<sup>24</sup> Sir Walter Scott wove a literary tale of Scotland which enamored the entire world. In a great variety of disciplines, Enlightenment Scots created a body of Enlightenment knowledge which served as an example for many Enlightenment thinkers throughout Europe.

However, in no area was Scotland more preeminent than in the medical sciences. As historian Guenter Risse argues, medicine was a central theme in Enlightenment thought in Scotland and the medical community served as an active participant in the development of Scottish education which allowed a greater breadth of Scotsmen to gain access to the widely available knowledge.<sup>25</sup> Within the University of Edinburgh, a medical education was both rigorous and well-respected. A first year medical student named Thomas Ismay described the intense program of study. The morning began with five and a half hours of class, followed by a short dinner break which was followed up by another three hours of class, a schedule which was made even more grueling by the hours of reading and the transcription of notes.<sup>26</sup> In 1873, the *Medical Times and Gazette*

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<sup>23</sup> Houston and Knox, 342.

<sup>24</sup> Houston and Knox, 344.

<sup>25</sup> Risse, 2.

<sup>26</sup> Cosh, 69-70.

published a history of the Medical School at the University of Edinburgh, stating, “it is interesting to watch the gradual early development of the Edinburgh Medical School up to the time when Provost Drummond and Professor Monro, properly estimating the conditions of success, wrought harmoniously in their different capacities towards the successful establishment of a vigorous Medical School,” a goal that proved exceptionally successful.<sup>27</sup> A previous edition of the same journal stated that Scotland had “within the University of Edinburgh by far the largest and most important medical school in the United Kingdom.”<sup>28</sup> The impact of the medical field on Scottish education was a beneficial one.

The strength of Scottish medicine came from the reputation it gained across the Western world. According to Alexander Grant who served as Principal of the University of Edinburgh at the end of the nineteenth century and wrote a complete history of the University beginning with its founding, the addition of surgery to the curriculum in Edinburgh was due to a petition which argued that “The high reputation which the University of Edinburgh enjoys as a school of Medicine, whither Students resort even from the continents of Europe and of America, is greatly due to the clinical instruction in Medicine.”<sup>29</sup> The diverse origin of its students allowed the University to spread its influence across the Western world as its graduates returned to their homes to practice their medicine and sing the praises of the Medical School at the University of Edinburgh. Members of the Massachusetts Medical Society and the New England Surgical Society commonly finished their medical degrees at the University of Edinburgh, a university which was “illustrious in the annals of

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<sup>27</sup> “The Edinburgh School of Medicine,” in *Medical Times and Gazette*, (December 13, 1873), in *The Medical Times and Gazette, A Journal of Medical Science, Literature, Criticism, and News*, Vol. 2 for 1873, (London: J. and A. Churchill, 11, New Burlington-Street, 1873), Google Books, (accessed March 25, 2011), 664.

<sup>28</sup> “Meeting of the University Council – Opening of the Session – Address by the Principal,” in *Medical Times and Gazette*, (November 15, 1873), in *The Medical Times and Gazette, A Journal of Medical Science, Literature, Criticism, and News*, Vol. 2 for 1873, (London: J. and A. Churchill, 11, New Burlington-Street, 1873), Google Books, (accessed March 25, 2011), 561.

<sup>29</sup> Alexander Grant, *The Story of the University of Edinburgh during Its First Three Hundred Years*, Vol. 1, (Edinburgh, 1884), printed by R. & R. Clark, Google Books, (accessed March 25, 2011), 322.

medicine,” before returning to Boston to practice their craft.<sup>30</sup> A similar experience was seen in Philadelphia. In 1767, Philadelphian Benjamin Rush reported in a letter that “The whole world I believe does not afford a set of greater men than are at present united in the College of Edinburgh.”<sup>31</sup> The respect in Philadelphia was so great for the University of Edinburgh that the Medical School at the College of Philadelphia was modeled after that at the University of Edinburgh. A history of the College of Philadelphia’s Medical Department reported that, “the individuals who composed the medical faculty of the College, the first occupants of the chairs, were graduates of the Edinburgh school, and had unavoidably acquired an affection and preference for its system of instruction.”<sup>32</sup> The medical community and specifically, the Medical School at the University of Edinburgh achieved great acclaim internationally and put Scotland at the top of the medical field in the eighteenth and nineteenth centuries.

### ***SMALLPOX’S PRESENCE IN SCOTLAND***

When historians study smallpox in Britain, England, and especially the cosmopolitan London, is usually the central focus. In the centuries leading up to the 1707 Act of Union, England was both more populous and wealthier than its northern neighbor. London was one of Europe’s oldest and largest cities and the capitol of the British Empire; after 1707, this empire encompassed Scotland as well. Smallpox quickly became endemic in London and the size of London’s population ensured that the disease continually found a source of victims. During the height of smallpox’s terror, nearly every person living in London was exposed to smallpox and epidemics occurred approximately once

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<sup>30</sup> “The Medical Magnates of Edinburgh,” in *Medical and Surgical Journal*, (April 24, 1884), in *The Boston Medical and Surgical Journal*, Vol. 110, ed. by George B. Shatuck and Abner Post, (Boston: Houghton, Mifflin and Company, 1884), Google Books, (accessed March 25, 2011), 401.

<sup>31</sup> Cosh, 65.

<sup>32</sup> Joseph Carson, *A History of the Medical Department of the University of Pennsylvania, from its Foundation in 1765, with Sketches of the Lives of Deceased Professors*, (Philadelphia: Lindsay and Blakiston, 1869), Google Books, (accessed March 25, 2011), 77.

every three years.<sup>33</sup> This made England and particularly London a popular source of information for the history of smallpox. However, by only studying London, an important piece of the puzzle is missing in the history of smallpox in Britain and historians can begin to fill this gap by evaluating Scotland's experience with smallpox.

In England, smallpox was only endemic in small areas of the country and in London. However, in Scotland, smallpox was endemic throughout the Scottish Lowlands by the 1680s.<sup>34</sup> Over the period of urbanization discussed above, the migration between the Highlands and Lowlands allowed smallpox to spread across the whole of Scotland.<sup>35</sup> Because of the prevalence and high mortality rate of smallpox, it was a common topic of consideration in Scotland. James Lind, a fellow of the Royal College of Physicians of Edinburgh, read a paper to the Philosophical and Medical Society of Edinburgh in which he stated that, "the small-pox has been for some ages past, and continues to be, the terror and destroyer of a great part of mankind."<sup>36</sup> This statement, which was made in 1763, represents a great trend of the eighteenth century. During this century, smallpox accounted for one sixth of all deaths in the bills of mortality in Scotland.<sup>37</sup>

Of these deaths, a significant percentage was made up of children. During outbreaks of smallpox, children between the ages of six months and two years represented between forty and fifty-five percent of all deaths.<sup>38</sup> Because of this, smallpox was often considered a childhood disease and parents would wait in suspense to see if their children contracted and survived the disease. In the Parish of Tarbat, Easter Ross, a coastal region in the county of Ross (see Figure 1-2), "the small-

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<sup>33</sup> Andrew B. Appleby, "Nutrition and Disease: The Case of London, 1550-1750," in *Journal of Interdisciplinary History*, 6(1), (Summer 1975), 13-15.

<sup>34</sup> R.A. Houston, *The Population History of Britain and Ireland, 1500-1750*, (London: MacMillan Education Ltd, 1992), 55.

<sup>35</sup> Houston, (1992), 73.

<sup>36</sup> James Lind, *Two papers on fevers and infection. Which were read before the Philosophical and Medical Society*, (London, 1763), printed for D. Wilson, at Plato's Head, in the Strand, Wellcome Library, (London), Closed Stores EPB/ B, 33641/B, 110.

<sup>37</sup> Flinn, *et.al.*, 292.

<sup>38</sup> Flinn, *et.al.*, 290.

pox [was] the disease which has proved most fatal to the rising generation. Its effects were particularly calamitous in 1756, which carried off 75 children. In 1768 it cut off 46, and 38 since the month of October last [1791]. Some families at those different times lost their whole children.”<sup>39</sup>

The devastation smallpox could cause a family meant parents devoted a great deal of time to finding the best way to treat, and later prevent, the smallpox from taking their children. Children were most vulnerable to this disease as smallpox produced lifelong immunity and thus, in areas where smallpox was endemic, those who survived to adulthood had likely already lived through smallpox and retained their immunity. In Scotland, where the disease was well established by the eighteenth century, this placed children at the top of the list of potential smallpox victims.

When studying the spread of smallpox in Scotland, few sources are as useful as Robert Cowan’s treatise on the vital statistics of Glasgow. Smallpox was endemic in Edinburgh prior to becoming endemic in Glasgow.<sup>40</sup> However, the migration during this period and the quick population growth Glasgow experienced, growth which allowed it to exceed Edinburgh in population size by 1821,<sup>41</sup> caused smallpox to establish itself in Scotland’s manufacturing center. Using the mortality bills of Glasgow, Cowan wrote a comprehensive account of smallpox in Scotland’s largest town. Cowan was a physician at the Glasgow Royal Infirmary and his paper on the vital statistics of Glasgow was of such interest to the period that it was read to the Statistical Society of Glasgow not once, but twice, in 1837 and again in 1838.<sup>42</sup>

Cowan’s treatise argues that smallpox has been prevalent in Glasgow and shows little signs of abating. Cowan concentrates much of his work on an epidemic of smallpox during the years 1835

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<sup>39</sup> Maisie Steven, *Parish Life in Eighteenth-Century Scotland: A Review of the Old Statistical Account*, (Aberdeen: Scottish Cultural Press, 1995), 81.

<sup>40</sup> Flinn, *et.al.*, 290.

<sup>41</sup> Houston and Knox, 282.

<sup>42</sup> Robert Cowan, *Vital statistics of Glasgow : I. Statistics of fever and small pox prior to 1837. II. Statistics of fever for 1837. III. Remarks suggested by the mortality bills*, (Glasgow: David Robertson, 1838), (Edinburgh: Adam and Charles Black, 1838), University of Edinburgh Centre for Research Collections, Main Library – Special Collections, P.198/11.

and 1836. His work finds that smallpox deaths in children under the age of ten averaged 101 per year in the years preceding 1812 but jumped to 903 deaths during the two years of the epidemic.<sup>43</sup> He also points out that admission to the Glasgow Royal Infirmary for smallpox steadily increased between 1795 and 1836. Admissions went from just 21 adults admitted between the years 1795 and 1801 to 117 between the years 1823 and 1829 and then 283 admissions between the years 1830 and 1836.<sup>44</sup>

Year	Total	Small-pox	Year	Total	Small-pox	Year	Total	Small-pox
<b>1783</b>	719	155	<b>1793</b>	1126	389	<b>1803</b>	940	194
<b>1784</b>	877	425	<b>1794</b>	759	235	<b>1804</b>	863	213
<b>1785</b>	744	218	<b>1795</b>	1048	402	<b>1805</b>	884	56
<b>1786</b>	941	348	<b>1796</b>	797	177	<b>1806</b>	786	28
<b>1787</b>	1016	410	<b>1797</b>	884	354	<b>1807</b>	899	97
<b>1788</b>	1059	399	<b>1798</b>	864	309	<b>1808</b>	1775	51
<b>1789</b>	1058	366	<b>1799</b>	1105	370	<b>1809</b>	1187	159
<b>1790</b>	1236	336	<b>1800</b>	746	257	<b>1810</b>	1027	28
<b>1791</b>	1367	607	<b>1801</b>	766	245	<b>1811</b>	1274	109
<b>1792</b>	902	202	<b>1802</b>	985	156	<b>1812</b>	1278	78
<b>1st Period</b>	<b>9919</b>	<b>3466</b>	<b>2d Period</b>	<b>9080</b>	<b>2894</b>	<b>3d Period</b>	<b>10913</b>	<b>1013</b>

Table 1-1: Total deaths and total deaths from smallpox in Glasgow in children under ten years of age<sup>45</sup>

Cowan also uses the work of Dr. Robert Watt, who worked with statistics of smallpox before Cowan, to discuss the earlier periods of smallpox in Glasgow. Using data from Dr. Watt, Cowan shows that deaths from smallpox in children under ten were declining during the end of the eighteenth century and beginning of the nineteenth century. As illustrated by Table 1-1, which is taken from Cowan's treatise, the percentage of deaths from smallpox accounted for 31.87 percent of all deaths in the first period represented on the table to only 9.28 percent of deaths by the third

<sup>43</sup> Cowan, 29.

<sup>44</sup> Cowan, 29.

<sup>45</sup> Cowan, 27-28.

period in the table.<sup>46</sup> Cowan attributes this decrease in childhood due to smallpox to the success of vaccination in Glasgow following Edward Jenner's discovery.

### ***AN ENLIGHTENMENT INQUIRY INTO SMALLPOX***

The eighteenth century was the golden age in Scotland. The Enlightenment came to Scotland at the end of the seventeenth century and culture began to flourish in the Scottish capital. With this came a rise in prominence of science. Among the general populace, science became an important consideration. In medicine, this was especially true. People began to wonder what caused their sickness and why some died while others lived. During the middle of the eighteenth century and into the nineteenth century, considerations on the medical basis of smallpox were published by experts in Edinburgh and by rural physicians alike.

The rise in medical curiosity caused a variety of materials on smallpox to be produced as the disease continued to plague the populace. One excellent description of the questions which preoccupied the medical community can be found in James Lind's paper on fevers and infections. In his paper, he talks about why smallpox has captured the imagination of the Scottish populace. He writes:

But the phenomena, even in the most manifest contagion, are often wonderfully mysterious, and altogether unaccountable... But from what origin, how, was this poison first engendered? Many opinions have been given, on this matter, equally incapable of proof or refutation. And the original causes of this as well as of several other contagions, continue still, perhaps among the hidden secrets of nature; notwithstanding the many plausible conjectures concerning them. The real existence of an infection can only be ascertained by its visible effects, many of which are also inexplicable.<sup>47</sup>

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<sup>46</sup> Cowan, 28.

<sup>47</sup> Lind, 110.

Lind indicates that smallpox has captured the imagination of the populace because it was an unexplained terror. Smallpox was capable of bringing devastation but few understood its secrets. It was the mysterious nature of the disease that initiated a vast amount of study in Scotland.

Both smallpox and measles were diseases which held this inexplicable nature and could devastate a population without any explanation. In 1761, a pamphlet entitled *A Discourse on the Small-Pox and Measles* was published in Edinburgh. The author, Richard Mead, was a physician to King George II and had died seven years prior to this publication. However, the topic continued to fascinate the public. In his pamphlet, Mead discusses the origins and different forms of smallpox as well as methods of treatment.<sup>48</sup> Mead attempts to discuss and explain each of the ideas about smallpox and its treatment which permeated British society.

A large section of his work describes the symptoms of smallpox and the sources of these symptoms. At one point, Mead attempts to draw parallels between the terror that the bloody sort of smallpox prompted and the horror caused by the poisonous bite of the Lybian serpent. To help draw these parallels, he includes a poem written by first century Roman poet Lucan. The symptoms which brought about these terrors, in Lucan's words, include:

His tears were bloody; nature's passages,  
For their own humours, were all fill'd with blood.  
His mouth, his nose, chok'd up with filthy clots:  
Red sweats transpir'd from all the skin inflam'd.  
His body seem'd one universal wound.<sup>49</sup>

Mead uses these parallels from the past to explain how the reactions of people in the present are common fears. Mortality is what made smallpox a dreaded disease and this concept is the same one which has created fear throughout the ages.

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<sup>48</sup> Richard Mead, M.D., *A Discourse on the Small-Pox and Measles*, (Edinburgh, 1763), printed by A. Donaldson and J. Reid, Eighteenth Century Collections Online, Gale, University of Michigan, (accessed March 15, 2010).

<sup>49</sup> Mead, 22.



However, what is especially interesting is the addition which Mead includes at the end of his pamphlet. Mead includes a treatise by the tenth century Arabian physician Abubeker Rhazes on smallpox and measles. The Enlightenment spread ideas about medicine and the classification of disease around the Western world and Scotland did not escape. Rhaze's treatise follows a format which Mead imitates in his own work, beginning by discussing the causes of smallpox and going on to discuss the different symptoms and cures for smallpox. The similarities between Scottish pamphlets and Rhazes's treatise do not end with the organization. The common thread of thought between Scotland and Arabia is a clear demonstration of the flow of ideas across the globe during the Enlightenment.

The seasons that posed a greater danger of contracting smallpox is an aspect of smallpox's characteristics that fascinated both Rhazes and eighteenth century Scots. According to Rhazes, "The seasons of the year in which the small-pox are most frequent, are in various: they rage most at the latter end of the autumn, and the beginning of spring."<sup>50</sup> In Scotland, this topic was taken up by William Woodville in 1797. Woodville published a pamphlet entitled *Advice to Parents on the Management of the Children in the Natural Small Pox and During Inoculation*. Keeping within the Enlightenment's attempt to examine all aspects of a subject, Woodville writes about multiple possibilities surrounding the disease. He declares that the natural smallpox usually occurs around the vernal equinox but then presents the view of two highly influential physicians. Woodville quotes Thomas Sydenham, an influential English physician.<sup>51,52</sup> who played an important role in producing clinical descriptions of disease. Sydenham "observe, that when it is irregular or dangerous, it begins

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<sup>50</sup> Mead, 67.

<sup>51</sup> Thomas Sydenham was a seventeenth century English physician whose descriptions of disease were important in eighteenth century medicine, especially outside of England. His work was important in describing the clinical aspects of many epidemic diseases, including chorea dysentery, gout, malaria, measles, smallpox, syphilis, and tuberculosis, and he re-introduced the objective and natural lenses of Hippocrates for examining disease. Although, unlike Hippocrates, Sydenham shifted his analysis from the individual person to the disease, which he argued, would follow the same process in all people with the disease (see footnote 52).

<sup>52</sup> Charles-Edward Amory Winslow, "The English Hippocrates," in *The Conquest of Epidemic Disease: A Chapter in the History of Ideas*, (Princeton University Press, 1943), 161-175.

sooner, as in January or February.<sup>53</sup> Woodville then quotes Boerhaave, a Dutch physician from the early eighteenth century who is viewed as the father of clinical education, who “says that if it arises in a place where it has been six years absent, and makes its appearance in January or February, the following summer will be attended with a fatal kind: but if it first appears in May, it will be of a mild kind.”<sup>54,55</sup> The common thread of ideas in Rhazes treatise and Woodville’s pamphlet illustrates a tie between Arabia, a land where ancient medical knowledge had been preserved during the Middle Ages, and Scotland, where the vibrancy of the Enlightenment harkened back to the natural philosophers of Ancient Greece and Rome.

The exchange of ideas is an important element of the Scottish Enlightenment and had a noticeable impact on the Scottish experience with smallpox. As the Scots looked to expand their scientific knowledge, they sought to use this new knowledge to enhance their understanding of smallpox, a disease which could come into their towns and steal away their children. As the desire for knowledge spread, so too did the amount of pamphlets distributed across the country. Physicians sought to explain smallpox while the curiosity of the Enlightenment spread across the Scottish countryside and the populace increasingly sought out scientific knowledge. The physicians and medical experts responded in mass, elaborating on any and all aspects of smallpox. Publications came out of Edinburgh which sought to discover the facts behind the ever-looming threat of smallpox.

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<sup>53</sup> William Woodville, M.D., F.L.S., *Advice to Parents on the Management of their Children in the Natural Small Pox and During Inoculation; with A Few Cases, Confirming the Authors Opinion*, (London, 1797), printed by S. and J. Ridge, Eighteenth Century Collections Online, Gale, University of Michigan, (accessed March 17, 2010), 6.

<sup>54</sup> Gillian Hull, “The Influence of Herman Boerhaave,” in *Journal of the Royal Society of Medicine*, 90, (September 1997), 512.

<sup>55</sup> Woodville, (1797), 6.

## **CONCLUSION**

The Scottish Enlightenment produced an environment ripe with the potential to advance medicine's understanding of smallpox. As smallpox continued to threaten the Scottish populace, medical experts went to work. Using the continually advancing knowledge which was produced during the Enlightenment and the new approaches to understanding science, the Scots pushed forward in their attempts to rid their country of this common cause of death.

In Scotland, this process was unique. The vastly different geography and demography of the Highlands and Lowlands created a special relationship between the people of the two regions. In the Highlands, people were poor, more spread out, and faced a difficult life, combating both the climate and the land. In the Lowlands, urbanization in the eighteenth century produced a more affluent and condensed population. The spread of both the disease and information progressed from the densely populated cities out into the rest of the Lowlands and then up to the Highlands through the progression of people across the Scottish countryside.

Smallpox spread across the country from the Lowlands to the Highlands, establishing endemic smallpox across the population throughout the late seventeenth century and into the eighteenth century. It began in Edinburgh and then spread to other cities and then out into the countryside and up into the Highlands. A study of Glasgow shows that smallpox continued to threaten the Scottish population well into the nineteenth century, continuing to kill a substantial portion of the children of Scotland. Because smallpox survivors were immune to the disease and smallpox was endemic in much of Scotland, most of the smallpox victims were children. Thus, while treatments were still under debate, children were some of the first to experience them.

The Scottish Enlightenment encouraged the continued research into the causes of smallpox and experts in the disease sought to educate the public on the causes of smallpox, producing

increasingly descriptive pamphlets on the subject. Ideas from ancient physicians and foreign physicians were used to help advance the field of medicine in Scotland. As time went on, physicians looked for new ways to treat both the natural and inoculated smallpox and ideas spread across the country.

As the Scottish Enlightenment spread the thirst for knowledge through the Scottish population, knowledge and culture flourished. Science and medicine were at the forefront of this trend and the field advanced with explosive speed. Smallpox was one of the most deadly threats to face the population and a great deal of research and work went into treating the disease and educating the public. The medical side of the Enlightenment created an important influx of information to the Scottish populace on the cause of the disease, information which shaped the treatment of the dangerous disease.

## CHAPTER TWO

### PROPOSING A CURE

The Scottish Enlightenment witnessed the rapid and widespread production of knowledge. In medicine, this took on two paths. First, people devoted a large amount of time and print to proposing different causes of illness, as discussed in Chapter One. Second, they put their knowledge to the test to find new treatments to rid their populations of deadly illnesses. These changes in the eighteenth century often brought about unprecedented changes and immense success in medical treatment. In regards to smallpox, the changes brought medicine to a new point in the fight against infectious diseases; it gave humanity the means to destroy a devastating disease. While nearly two centuries would pass before Edward Jenner's vaccination procedure would aid the world in eradicating smallpox, the developments of the eighteenth century played an important role in changing the field of medicine.

In Scotland, the Enlightenment had brought about changes in the field of medicine that revolutionized how people responded to epidemics and cases of disease. These medical changes were spread through the use of pamphlets, treatises, and published lectures. While Chapter One discussed the publications which expounded upon the causes and identification of smallpox, here the publications which outlined methods of care are examined. During the century between 1750 and 1850, hundreds of publications were spread amongst the Scottish population. The National

Library of Scotland itself has preserved more than a hundred publications dating from the period on smallpox and its effects and treatments.<sup>1</sup>

During this period many different ideas developed regarding the most successful methods of treatment for patients with smallpox. The authors of these differing opinions often came from similar backgrounds. The Royal College of Physicians of Edinburgh, the Royal College of Surgeons of Edinburgh, and the Medical School at the University of Edinburgh, three institutions which sat at the head of the Scottish medical community, were often the places to look for ideas. The men of these institutions shaped the medical ideas surrounding smallpox and it was these men who later took up the public debate on the benefits of the two most controversial treatment methods – inoculation and vaccination. As the Scottish populace began to accept some methods as common place, they continued to push others aside. However, Scotland was by no means a completely united country when it came to medical treatment. Because of this, the acceptance and prominence of new medical ideas varied across the country and the peoples of Scotland spouted opinions as varied as the country itself.

### ***INFLUENTIAL MEN AND THEIR ORGANIZATIONS***

The suggested medical techniques which shaped the treatment of smallpox came from a variety of men but there was an important similarity amongst them. In nearly every publication, the authors can be traced back to three groups: The Royal College of Physicians of Edinburgh, the Royal College of Surgeons of Edinburgh, and the Medical School at the University of Edinburgh. Fellows of these three institutions represented the leading Scottish physicians and medical practitioners who

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<sup>1</sup> Information taken from a search of the National Library of Scotland's main catalogue, (search key word – anywhere: "small pox" followed by posted limit – publication date range: 1750-1850), <http://main-cat.nls.uk/cgi-bin/Pwebrecon.cgi>, (accessed January 26, 2011).

sought to educate the public and their fellow physicians on the leading methods to prevent the spread and fatality of the dangerous smallpox.

### ***THE ROYAL COLLEGES OF EDINBURGH***

Beginning in the seventeenth century, the professional landscape of medicine in Scotland was transformed with the foundation of the Royal College of Physicians of Edinburgh (RCPE).

In the sixteenth century, the surgeons had organized into a craft incorporation but then joined the physicians of Edinburgh with their



Figure 2-1: Line Engraving of Physicians' Hall, George Street, Edinburgh by J. Henshall – Home to the Royal College of Physicians of Edinburgh from 1781-1843<sup>2</sup>

own Royal College (RCSE) in the late eighteenth century.<sup>3</sup> Through the growing work and influence of these two institutions, the smallpox treatments proposed by these men received a thorough examination through an organized forum of educated individuals.

On November 29, 1681, twenty-one men formed the first group of fellows of the Royal College of Physicians of Edinburgh under a Royal Charter from Charles II.<sup>4,5</sup> While the group began

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<sup>2</sup> J. Henshall, *Physicians' Hall, George Street, Edinburgh*, (1829), Sibbald Library, Royal College of Physicians of Edinburgh, <http://www.rcpe.ac.uk/library/exhibitions/engravings/building/rcpe-george-street.php>, (accessed February 4, 2011).

<sup>3</sup> Mary Cosh, *Edinburgh: The Golden Age*, (Edinburgh: John Donald Publishers, 2003), 66.

<sup>4</sup> Royal College of Physicians, *Historical Sketch and Laws of the Royal College of Physicians of Edinburgh from Its Earliest Institution to August 1882*, (Edinburgh, 1882), printed for the Royal College of Physicians, Google Books, (accessed February 3, 2011), 1.

by meeting in the homes of its members, the number of fellows and the size of the College's library soon necessitated that the RCPE find a building to house the group more permanently.<sup>6</sup> This was accomplished when they built Physicians' Hall on George Street in Edinburgh (Figure 1), where they were located from 1781 until 1843, when they moved to a new building on Queens Street.<sup>7</sup> This growth can be seen in the number of fellows which were inducted into the College between the years 1750 and 1850. During this time, which began only seventy years after the foundation of the society, 357 men were made fellows of the College and an additional 28 men became honorary fellows.<sup>8</sup>

An indirect examination of the influence and power of this organization can be seen through the writings of its members and the international reach of the College. In this chapter, nine physicians' views of smallpox are discussed and of these, two were full members of the Royal College of Physicians – William Buchan, admitted in November of 1772, and John Thomson, admitted in August of 1830 – and yet another was an honorary member – Richard Mead, honorary admission in May of 1745.<sup>9</sup> James Lind, whose treatise was discussed in Chapter One was also a member of the RCPE, admitted in 1750. On Eighteenth Century Collections Online, a database with a goal of digitizing all eighteenth century manuscripts and currently holds over 180,000 titles from the eighteenth century, James Lind has nineteen publications listed. His publications from the 1700s were published as close to home as Edinburgh and as far away as New York.<sup>10</sup> The nineteen publications of James Lind amount to only a pittance when compared with the publications of

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<sup>5</sup> Ronald H. Girdwood, "Three Hundred Year of the Royal College of Physicians of Edinburgh," in *British Medical Journal (Clinical Research Edition)*, 283(6292), (September 5, 1981), Jstor, University of Michigan, (accessed February 9, 2011), 682.

<sup>6</sup> Royal College of Physicians, 29-30.

<sup>7</sup> Girdwood, 652.

<sup>8</sup> Royal College of Physicians, 3-11, 16.

<sup>9</sup> Royal College of Physicians, 4, 8, 16.

<sup>10</sup> Information taken from an author search of "James Lind" on Eighteenth Century Collections Online, Gale, University of Michigan, (accessed February 28, 2011).



William Buchan. Eighteenth Century Collections Online has catalogued a total of forty-seven publication by William Buchan, which were published over an interval of less than thirty years. Of these publications, twenty were published outside of Britain with seven published in Dublin and thirteen published in America, in cities ranging from Boston and Philadelphia to Waterford, New York and New-London, Connecticut.<sup>11</sup> The members of the RCPE were prolific writers and were able to find publishers around the world in order to introduce a wider audience to their theories.

However, the international reach of the College did not just consist of members who published internationally. Of the 357 men who were admitted to the College between the years 1750 and 1850, thirty-four men had received their medical degrees outside of Scotland (see Table 2-1). These degrees had come from cities as close as Cambridge and as far away as Pisa. The

Rheims	Leyden	Pisa	Giessen	Erlangen	Heidelberg	Jena	Kiel	Berlin	Cambridge
1752	1778	1832	1834	1836	1836	1837	1837	1839	1840
1758	1791	1840	1843	1836	1838				
1760	1796		1844	1838	1839				
1765	1822		1845	1841	1839				
1768			1845	1843					
			1847	1845					
				1848					
				1848					
				1848					

Table 2-1: Cities and Years in which Fellows were admitted to the Royal College of Physicians of Edinburgh with degrees from Cities outside of Scotland<sup>12</sup>

<sup>11</sup> Information taken from an author search of “William Buchan” on Eighteenth Century Collections Online, Gale, University of Michigan, (accessed February 28, 2011).

<sup>12</sup> Royal College of Physicians of Edinburgh, 3-11.

remaining eight cities came from the Netherlands and the German states. The international influence of the College was growing through the eighteenth and nineteenth centuries, with nine of the thirty-four men admitted in the first seventy-five years of the period and the remaining twenty-five, a group nearly three times larger, admitted in the last twenty-five years of the period.

Furthermore, the Royal College of Physicians of Edinburgh became an accepted leader in medical knowledge by the European medical community. In medicine, Scotland, and Edinburgh in particular, was gaining an international reputation, a reputation which included London, a city where the Scots often lacked clout among the leading intellectuals and aristocracy. In one instance in 1803, a reform movement was afoot in the medical community to adopt new nomenclature standards to meet with the recent advances in chemical knowledge which came out of the transformation of alchemy into chemistry during the Enlightenment. In a reading to the Liverpool Medical Society, John Bostock, an established physician throughout Britain,<sup>13</sup> discussed this movement. According to Bostock, "The Edinburgh College of Physicians adopted [the plan to reform the nomenclature], in an edition of the Pharmacopeia, which they published in 1803, and, it is reported, that the London College have determined to follow the example."<sup>14</sup> The Pharmacopeia mentioned by Bostock was used to standardize the chemical composition of medicines, including those used to treat smallpox. Thirty-five years later, a further alteration to the Pharmacopeia was written up in America. The *American Journal of Pharmacy*, published by the Philadelphia College of Pharmacy, included an article entitled "Report of the Royal College of Physicians of Edinburgh on the Adulteration of Drugs" in an 1838 edition. This article describes an alteration to the Pharmacopeia which will be used to establish the purity of the chemicals used in medical treatment, including

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<sup>13</sup> John Bostock was a member of the London Medical and Chirurgical Society as well as the Liverpool Medical Society, and served as the President of the Edinburgh Medical Society (see footnote 14).

<sup>14</sup> John Bostock, *Remarks on the Reform of the Pharmaceutical Nomenclature; and Particularly on that Adopted by the Edinburgh College; Read Before the Liverpool Medical Society*, (Liverpool, 1807), printed by G.F. Harris for Longman, Hurst, Rees, and Orme, Wellcome Library, (London), Closed Stores EPB Tracts, T.88.1., 2.

laudanum, a common medicine in treating smallpox.<sup>15</sup> According to an appendix to the article, after examining the laudanum sold in shops around both Edinburgh and the Scottish countryside, “the difference between the laudanums of the shops in point of strength, is in the ratio of three to one,” a difference which he believed would be even greater if a more accurate method was used.<sup>16</sup> These changes, which made it across the Atlantic, were subsequently proposed to and adopted by the Royal College of Physicians in London, a proposal made by the members of the RCPE, as yet another instance of the growing prominence of the Edinburgh institution.<sup>17</sup>

Despite the growing influence of the RCPE, the city of Edinburgh had been working towards organization in the medical community for more than a century before the physicians organized into a formal college. In 1505, the surgeons and barbers of Edinburgh united in a corporation, a move which was followed by the union of the surgeons and apothecaries in 1657.<sup>18</sup> In 1722, the barbers separated themselves from the surgeons and the surgeons were formally incorporated into the Royal College of Surgeons of the city of Edinburgh in 1778.<sup>19</sup> The shift from an incorporation to a college came with an increase in power. Additionally, just as the influence of the physicians grew with the increasing size of the RCPE, so too did the influence of the surgeons. In the 1730s, there were 137 entering members of the surgeons corporation at all levels, from full fellows down through servants and apprentices. By the nineteenth century, from 1810-1819, after the formal

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<sup>15</sup> Joseph Carson and Robert Bridges, ed, *The American Journal of Pharmacy, Published by Authority of the Philadelphia College of Pharmacy*, Vol. 4, (Philadelphia: Merrihew and Gunn Printers, 1839), Google Books, (accessed February 28, 2011), 114-128.

<sup>16</sup> Carson and Bridges, 128.

<sup>17</sup> Carson and Bridges, 140.

<sup>18</sup> Hugo Arnot, *The History of Edinburgh, From the Earliest Accounts to the Present Time*, (Edinburgh, 1788), printed for William Creech, Eighteenth Century Collections Online, Gale, University of Michigan, (accessed February 28, 2011), 524.

<sup>19</sup> Arnot, 525.

incorporation of the surgeons into a college, 161 new members entered the college, including thirty-four new full fellows.<sup>20</sup>

The Enlightenment's emphasis on the spread of knowledge also aided the Royal College of Surgeons of Edinburgh in gaining influence in the medical community through the production of publications. While not as prolific as the RCPE, the RCSE played an important role in producing medical literature in the eighteenth and early nineteenth century, including work on smallpox. John Thomson, who was admitted to the RCPE in 1830, was a professor to the RCSE prior to his admittance to the College of Physicians. Additionally, the physician Robert Walker and his work on smallpox represents another example of the well respected work of the RCSE. According to an entry in a compilation of the commentaries on medical philosophy for the year 1780, Walker's work was "a subject well meriting the attention, not only of the humane physician, but even of the Legislature itself. And although every practitioner may not be disposed to adopt all Dr. Walker's reasoning upon this subject; yet, in our opinion, every candid reader will derive much satisfaction from a careful perusal of his work."<sup>21</sup> Furthermore, the international influence of the fellows was enhanced through their publications. In the same journal which published the article on the Royal College of Physician's work on the Pharmacopeia, Douglas Maclagan, a fellow of the RCSE published a *Notice Regarding the Composition of James' Powder*. In the article, Maclagan discusses the composition and uses of the "fever powder" of a Dr. James.<sup>22</sup> This publication, which was published in America, harkens back to the RCSE's close connections with the apothecaries as well as their rising international presence. The influential publications of the RCSE played an important role in the medical field.

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<sup>20</sup> Helen M. Dingwall, *'A Famous and Flourishing Society': The History of the Royal College of Surgeons of Edinburgh, 1505-2005*, (Edinburgh University Press, 2005), 109.

<sup>21</sup> Andrew Duncan, *Medical Commentaries for the Year M.DCC.LC, Exhibiting a Concise View of the Latest and Most Important Discoveries in Medicine and Medical Philosophy*, Vol. V, (Edinburgh, 1780), printed for Peter Hill, Eighteenth Century Collections Online, Gale, University of Michigan, (accessed March 2, 2011), 171-172.

<sup>22</sup> Carson and Bridges, 152.

Despite the two separate colleges, it was often the joint work of the two groups which brought out the greatest impact on the medical community. The work of the RCPE on the Pharmacopeia was conducted in conjunction with the RCSE. According to the article in the *American Journal of Pharmacy*, the College of Surgeons had begun to look into the problems in the Pharmacopeia and “a short time ago the [College of Physicians] was requested to cooperate with its sister institution, and the two bodies have resolved to join in the investigation. It cannot be doubted that they will proceed cordially in the task they have thus laid down for themselves.”<sup>23</sup>

However, perhaps the most prominent example of cooperation can be found in the Royal Infirmary of Edinburgh. The Royal Infirmary of Edinburgh was founded in 1729 by the RCPE and began including surgeons from the Incorporation of Surgeons in 1738.<sup>24</sup> Despite the hesitation of physicians to treat smallpox in the infirmaries and hospitals of Scotland due to the danger of spreading the disease throughout the hospitals, the Royal Infirmary of Edinburgh did admit and treat smallpox patients, providing a setting for the institutional and more uniform treatment of the disease years before the Smallpox Hospitals were opened. Guenter Risse points out in his book *Hospital Life in Enlightenment Scotland* that “contemporaries were impressed by [the Royal Infirmary’s] cleanliness, low mortality, and valuable in-house pharmacopoeia.”<sup>25</sup> In the eighteenth century, the Royal Infirmary admitted twenty-seven cases of smallpox, a number which represents only a small percentage of the cases in Scotland.<sup>26</sup> Despite the willingness of the Infirmary to admit smallpox patients and the continual supply of smallpox victims in Edinburgh, they were only admitted under specific circumstances which accounts for the small number. Small children, who were some of the most common smallpox patients, were not allowed admission to the Royal

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<sup>23</sup> Carson and Bridges, 117.

<sup>24</sup> Cosh, 66-67.

<sup>25</sup> Guenter Risse, *Hospital Life in Enlightenment Scotland: Care and Teaching at the Royal Infirmary of Edinburgh*, (Cambridge University Press, 1986), 3.

<sup>26</sup> Risse, 131.

Infirmary. Additionally, eligible patients were only admitted when a small room with only two beds was available where the patient could “be moved from time to time from one of these beds to the other if unoccupied” and “vapors of warm vinegar and even the burning of tobacco leaves” could be used to prevent the movement of the smallpox through the air.<sup>27</sup> The development of this hospital for treatment of smallpox and other illnesses through the cooperation of the Royal Colleges of Physicians and Surgeons represented an excellent example of the influence of organized medicine on the developing treatments for smallpox.

### ***THE UNIVERSITY OF EDINBURGH***

Despite the prominence and international reach of the Royal Colleges in Edinburgh, the Medical School at the University of Edinburgh represented an even greater source of prestige for Scotland. The Medical School at the University of Edinburgh, which was discussed in Chapter One, was an important source of medical knowledge in the treatment of smallpox. Dr. Alexander Monro was the third member of the Monro dynasty at the Medical School at the University of Edinburgh and one of the most respected members of the medical community.<sup>28,29</sup> Additionally, John Thomson, who was a member of both the Royal College of Physicians and the Royal College of Surgeons also served as a Professor of Military Surgery at the University of Edinburgh’s Medical School.<sup>30</sup> Furthermore, the work of John Brown, which was compiled by Dr. Francis Carter, represents a compilation of all the systems of medicine in practice at the time. Brown, who served

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<sup>27</sup> Risse, 136.

<sup>28</sup> Dr. Monro was the grandson of Alexander Monro I, who was chair of Anatomy in the Edinburgh faculty of medicine from 1720-1758, and son of Alexander Monro II, who was chair of Anatomy from 1758-1798. Dr. Monro (Alexander Monro III) was then chair of Anatomy himself from 1798-1846, representing a dynasty of medical knowledge and teaching in Scotland which lasted for 126 years (see footnote 29).

<sup>29</sup> J.B. Morrell, “The University of Edinburgh in the Late Eighteenth Century: Its Scientific Eminence and Academic Structure,” in *Isis*, 62(2), (1971), 163.

<sup>30</sup> John Thomson, M.D., F.R.S.E., *An Account of the Varioloid Epidemic, which has lately prevailed in Edinburgh and Other Parts of Scotland; with Observations on the Identity of Chicken-Pox with Modified Small-Pox*, (Philadelphia, 1824), published by H.C. Carey and I. Lea, Google Books, (accessed March 15, 2010).

as a lecturer on medicine and as the president of the Royal Medical Society at the University, a society which served as the University's student organization, was able to identify all the important medical advancements of the time and compile them for later uses.<sup>31</sup> These cases serve as an example of the University's close ties to the advances in smallpox treatment.

However, it was not only through the publications of its professors that the Medical School at the University of Edinburgh contributed to the treatment of smallpox. This disease was an important topic of discussion in lectures after the devastation it had caused over the course of the seventeenth and eighteenth centuries. Andrew Duncan was the chair of the Theory of Medicine from 1790-1819.<sup>32</sup> In 1790, he published syllabi of his lectures on the theory and practice of medicine. The ninth item on his list of discussions is the treatment of smallpox epidemics. Duncan's lecture seeks to teach his students all aspects of medical treatment of smallpox and his lectures touch on many of the leading theories on treatment. In his syllabus, Duncan declares that his lectures will cover "Observation on the measures recommended during the eruptive state – blood-letting – exposure to cool air – acidulated diluents drink – cathartics – emetics – mercurials – Observations on the treatment of convulsion occurring during the eruptive stage – opium – tepid bathing" as well as the patient's recommended diet.<sup>33</sup> The University of Edinburgh's Medical School taught the leading theories of treatment for smallpox to the upcoming physicians of the eighteenth century, theories which they later reproduced in the literature of the era which surrounded the medical debates at the height of smallpox.

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<sup>31</sup> Francis Carter, M.D., *An Account of the Various Systems of Medicine, from the days of Hippocrates to the Present Time: Collected from the Best Latin, French and English Authors, particularly from the Works of John Brown, M.D. Lecturer on Medicine and President of the Royal Medical Society, in Edinburgh, &c.*, Vol. II, (London, 1788), sold by Mr. Murray, 32 Fleet Street; Mr. Balfour, Edinburgh; Mr. White, Dublin; and most of the principal booksellers in Great Britain and Ireland, Eighteenth Century Collections Online, Gale, University of Michigan, (accessed January 3, 2011), 177.

<sup>32</sup> Morell, 163.

<sup>33</sup> Andrew Duncan, *Heads of Lectures on the Theory and Practice of Medicine*, (Edinburgh, 1790), printed for Watson, Elder, and Company, Eighteenth Century Collections Online, Gale, University of Michigan, (accessed March 7, 2011), 235.

## ***MEDICAL RESPONSE TO SMALLPOX***

In the eighteenth century, the Scots were exposed to a vast number of pamphlets which outlined the methods of care for those with the natural smallpox, and later, for those with inoculated smallpox. Physicians and concerned individuals published numerous pamphlets or lectures which suggested successful treatments or argued for novel innovations in treatment. In their pamphlets, physicians described the course of treatment they had found effective or ineffective. As Guenter Risse states in his study of the Royal Infirmary of Edinburgh, “most eighteenth-century healing strategies summarized under the rubric ‘art of medicine’ were actions found to be clinically useful, tangible enough to evoke physiological responses, and above all, acceptable to and even welcomed by patients.”<sup>34</sup> It was important to the physicians that their patients be amenable to new treatments and therefore they sought to educate the public on these advancements. Because of this, most physicians published descriptions of specific cases of smallpox they had witnessed, treated, or been informed about. Through these examples, a theory of practice emerges on how Scottish physicians responded to smallpox.

To begin with, it is useful to examine case history of an unsuccessful treatment of smallpox as well as that of a successful treatment. Risse includes a complete case file in the appendix of his book which includes a case of a man who died as a result of smallpox. The file comes from the notebook of a physician by the name of John Gregory who was conducting a clinical rotation in the teaching ward at the Royal Infirmary of Edinburgh and, in the notebook, Gregory recorded the admission of a man who was diagnosed with smallpox on November 29, 1771.<sup>35</sup> The patient came into the hospital complaining of headache, shivering, back pain, nausea, thirst, slight cough, and an

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<sup>34</sup> Risse, 178.

<sup>35</sup> Risse, 326-329.



eruption which had appeared the day before. While at home, the patient had been drinking warm fluids to induce sweating for two nights, following a traditional sweating method.

Once admitted to the Royal Infirmary of Edinburgh, Gregory administered a regimen consisting of fluids, laudanum (an opium-based sedative), enema injections, and topical poultices. Physicians also administered blisters to the feet, neck, and head to cleanse the body of pus and the patient was ordered to breathe in the steam of a hot water and vinegar solution. When the patient complained of cold feet, a warm water bath was administered to maintain a warm body temperature which is necessary for the sweating treatment. However, despite careful observation and continual care, John Gregory's December 17, 1771 entry reads that the patient "*Died* at 3p.m. On dissection no praeternatural appearance, but the lungs in a very inflamed state."<sup>36</sup> Despite being in the care of the Royal Infirmary of Edinburgh for three weeks, an institution which as previously stated was considered to provide quality treatment, the patient failed to survive his case of smallpox and the sweating treatment and the poultices, enemas, and blistering failed to provide a cure. As was common in this period, smallpox proved fatal despite treatment.

While the case treated by Gregory and described by Risse resulted in death, John Thomson published a case which resulted in the successful treatment of smallpox in an eleven year old boy. John Thomson was a professor of surgery in Edinburgh and an honorary member of the Royal Medical Society of Edinburgh who published a detailed account of a smallpox epidemic in Edinburgh in the first quarter of the nineteenth century. In this account, the case of the young boy is presented through a letter composed by his father to send to the Dr. Monro mentioned earlier in relation to the University of Edinburgh. In the account, the boy presented with headache, pain in his

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<sup>36</sup> Risse, 329.

right side, reddened skin, and flushed cheeks.<sup>37</sup> The entire account of his treatment, which was ultimately successful, follows:

My son, immediately on his arrival from school on Tuesday, was bathed in tepid water, and put to bed; and I administered to him a bolus, containing four grains of calomel, which, before night, produced several copious stools, consisting of highly offensive bilious matter. He passed, however, a most distressing night, being watchful and delirious.

On Wednesday, his skin still continuing extremely hot, he was occasionally sponged with vinegar and cold water. He was plentifully supplied with lemonade and orange juice, and in the evening his calomel bolus was repeated.

That night he never slept, and was highly delirious, insomuch that I was about to put leeches to his temples, when, on Thursday morning, I perceived a popular eruption beginning to appear upon his feet and around his ankle joints; it then began to appear about his wrists and fingers, and in circular clusters on the inside of his thighs, (the clusters about the size of a half-crown piece,) and then spread to his face, and soon almost covered it, particularly affecting his eyelids. As the eruption spread, his skin, which had continued excessively hot, grew cooler and more soft, and the pain of his head, which had been most urgent, began to abate; its heat, which had been intense, moderated, and he became perfectly collected. Before Thursday evening some of the papulae became distinctly vesicular, the vesicles being full, hemispherical, without any depression, and containing a watery fluid. They were pretty thickly spread over his face, hands, legs, and thighs, and there were a few on his body, but none upon his breast. His principal complaint on Thursday night was intense itching, and he was very restless and somewhat delirious that night. From this day to the present date he was seen by Dr. Thomson.

On Friday morning I found his skin much cooler; his tongue clean, but still rather more red than natural, and the vesicles prominent and full of watery fluid; the intervals occupied with the red popular eruption. His bowels being costive, he had 3ij. Of Epsom salts, which purged him freely.

On Saturday all the appearances were the same; and on this day I took six charges of limpid fluid from the vesicles, for the purposes of experiment.

On Sunday there was little change except that the fluid in the vesicles became thick and yellow. This day he was seen by Dr. Duncan, junior. Towards evening the pustules began to dry up in many places, and the popular eruption to scale off, giving an appearance to the skin as if it had been sprinkled with reddish half-dried jelly.

On Monday he was seen by yourself [Dr. Monro] and Mr. Bryce.

On my return home last night, (the 17<sup>th</sup>,) or the ninth night of his illness, I found him better in every respect; no fever, and nothing but the marks of the eruption remaining. I should have mentioned, that a ptyalism came on Thursday,

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<sup>37</sup> Thomson, 350.

and that a pustule formed on the inner part of the globe of his right eye, and a few very small ones on the margin of the lids; all these have now disappeared.<sup>38</sup>

The case of this boy presents several different treatments. He begins with elements of the cooling treatment, which was gaining popularity rapidly during the latter half of the eighteenth century, and then later added elements of dietary treatment and medications.

### ***THE SWEATING REGIMEN***

The sweating or warm treatment, which was used in the first case discussed above, was a common treatment prescribed to patients with smallpox. According to this theory of medicine, “in the mild pox and measles, Sweating, bleeding and purging are to be used” in proportion to the severity of the distemper.<sup>39</sup> In the treatise on medical systems written by Francis Carter based on John Brown’s notes, the directions for this method of care are laid out:

When the symptoms of such sweating are perceived, nothing else is requisite, except to apply woollen to the body, to give warm drink, to avoid cool air, to sweat a sufficient length of time X [10] hours at least or even XII [12]. If by this means it flows in a plentiful manner from all parts of the body all medicine will be useless. Which sweating, after it has subsided in part, yet should it not have answered the ends expected, Dover’s powder must be administered until the intention of such is fully obtained. Along with which administration, cold water is sometimes added, and the body kept well covered, but the use of warm drink is often found more useful.<sup>40</sup>

In general, this treatment supported the idea that the agents of the disease could be purged from the body through the sweat. As such, as Carter’s treatise suggests, constant heat was the goal of the sweating treatment in order to allow the disease to run its course quickly, and when ten or twelve days was not sufficient, further efforts were taken to expel the disease.

While the sweating or warm treatment continued to be used by physicians to treat smallpox infections, it often failed to lead to a cure, as it failed to do with John Gregory’s patient. The

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<sup>38</sup> Thomson, 351-352.

<sup>39</sup> Carter, 177.

<sup>40</sup> Carter, 172.

ineffectiveness of this treatment sent physicians looking for a new method of care. Some physicians simply believed smallpox could not be cured regardless of what method was used. According to John Andrew, an English inoculator who practiced in the 1760s, “whether we practice in the cooling method, recommended by Sydenham; give the heating Medicine prescribed by Moreton; or pursue the Middle Tract, with our celebrated countryman, Dr. Huxham (which seems most rational), or, with Friend, endeavour to purge off the secondary Fever; we shall find, I believe, the small-pox will carry off near one in seven of those who have it naturally.”<sup>41</sup> This high rate of mortality, regardless of treatment, was further supported by Robert Cowan’s study of smallpox in Glasgow, where he found that smallpox was generally fatal in one in seven children under the age of ten but fatality had risen to one in three in this age group and had held at this rate for an extended period of time.<sup>42</sup>

### ***THE COOLING REGIMEN***

However, the hopelessness which some physicians had for curing smallpox did not prevent others from proposing new and, in their opinions, more successful methods. One of the most commonly discussed methods which came up in pamphlets regarding smallpox treatment was the emerging cool treatment. The cool treatment was a development of the English physician Thomas Sydenham and promoted fresh air and cold drinks during illness, as opposed to the old sweating method which kept windows closed and patients warm.<sup>43</sup> While Sydenham was an English physician, his ideas were well received by medical practitioners in Scotland.

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<sup>41</sup> John Andrew, *The practice of inoculation impartially considered; its signal advantages fully proved; and the popular objections against it, confuted; in a letter to Sir Edward Wilmot*, (Exter: J. Spencer, 1765), University of Edinburgh Centre for Research Collections, Main Library – Special Collections, H. 23. 79/2, 34.

<sup>42</sup> Robert Cowan, *Vital Statistics of Glasgow : I. Statistics of fever and small pox prior to 1837. II. Statistics of fever for 1837. III. Remarks suggested by the mortality bills*, (Glasgow: David Robertson, 1838), (Edinburgh: Adam and Charles Black, 1838), University of Edinburgh Centre for Research Collections, Main Library – Special Collections, P .198/11, 28.

<sup>43</sup> Deborah Brunton, “Smallpox Inoculation and Demographic Trends in Eighteenth-Century Scotland,” in *Medical History*, 36, (1992), 410-411.

Carter and Brown's treatise on medical systems extols the benefits of this method. In his treatise, Carter states, "Confess the truth. Acknowledge with sincerity that these errors are the other remnants of [a doctrine], which supposes that heat and other stimulants assisted and cold obstructed perspiration. The error of which doctrine both in the pox and other cases, has been proved by an illustrious man [Sydenham]."<sup>44</sup> According to Carter:

For if cold always, and from its peculiar operation *debilitates*, if it seems other wise to operate, because a succeeding or alternate heat changes its effect into a stimulant one, if it alone cures the small pox, or prevents their violence, if it be the best remedy against a Catarrh, as where heat is avoided, is of great use in every sthenic complaint, we cannot doubt, but this same cold is very advantageous in disorders of a very sthenic nature.<sup>45</sup>

This statement, which argues the benefit of the cool treatment not just for smallpox but for all excitable and violent diseases, shows a belief that the cool treatment is the only possible treatment for the successful cure of the smallpox.

The cooling regimen was a topic of discussion in many publications but, in order to determine how prevalent this method actually was in Scotland, the details of treatment in these pamphlets must be compared. While some of the details of the method vary from author to author, the general belief in keeping the body cool and administering a cool diet is consistent. One concise description of the cooling method comes from Robert Walker, a fellow of the RCSE, who explains the method in his treatise, published in 1790, on treating and preventing the smallpox. Walker states, "I am persuaded, this method of cure is the best that is generally practiced. It is true, the large and well ventilated chamber, the light covering, the cooling fruits, and subacid drinks, were highly agreeable to the patient."<sup>46</sup>

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<sup>44</sup> Carter, 161.

<sup>45</sup> Carter, 158.

<sup>46</sup> Robert Walker, *An Inquiry into the small-pox, medical and political: wherein a successful method of treating that disease is proposed, the cause of pits explained, and the methods of their prevention pointed out: with an appendix representing the present state of small-pox*, (Edinburgh, 1790), printed for W. Creech, C. Elliot, P. Hill,

Two additional publications present a similar yet more detailed description of the cooling treatment, one which was published in 1763 and another, which was published over sixty years later, in 1824. The first of these descriptions was written by Richard Mead, the physician to King George II who was discussed in Chapter One. While Mead does not support a physician who experiments with new methods or extreme treatments “at the expense of unhappy people’s lives,” he has found that this is not the case when physicians follow a path where the patient is neither stifled with heat nor frozen in the cold would lead to a successful treatment of smallpox through the cool regimen.<sup>47</sup> Through this treatment, “great care ought to be taken in general, to supply him with pure and cool air, which he may take in plentifully: because a hot air causes difficulty of breathing, checks the secretion of urine, and increases the number of pustules on the internal organs of the body; the consequences whereof we may justly apprehend to be inflammations, and towards the end of the disease, gangrenes.”<sup>48</sup>

Mead concludes his chapter on the methods of curing smallpox by describing the case of a fifteen year old boy who came down with a malignant form of smallpox and was treated according to a successful cure following Mead’s theories. The method of treatment, which can be seen in Table 2-2, shows the importance of bloodletting, of a carefully regulated, cooling and acidic diet, of treatment through medications, and of fresh air. Based on Mead’s observations, this case shows “a most remarkable instance of what I have already said more than once, that is, how solicitous nature always is, at any rate to expel the poisonous matter of this disease out of the body.”<sup>49</sup>

Mead argues his theories to the public and medical audiences using careful reasoning and

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J. Elder, and G. Mudie, University of Edinburgh Centre for Research Collections, Main Library – Special Collections, E.B. .616912 Wal., 224.

<sup>47</sup> Richard Mead, M.D., *A Discourse on the Small-Pox and Measles*, (Edinburgh, 1763), printed by A. Donaldson and J. Reid, Eighteenth Century Collections Online, Gale, University of Michigan, (accessed March 15, 2010), 23.

<sup>48</sup> Mead, 23.

<sup>49</sup> Mead, 38.

Day since the disease first presented	Treatment ordered for the patient by his physician
One	Patient directed to be let blood, and to take a vomit
Two	To take a gentle purge in the morning
Three	The small-pox flushed out. The pustules were very numerous and small all over the body, looking more like a rank measles than the small-pox. As his fever ran very high, he was ordered draughts of Gascoign's power with nitre, to be taken every six hours; and to drink plentifully of barley-water acidulated with spirit of vitriol <sup>50,51</sup>
Four	As he was very delirious, in order to procure sleep, a paregoric of six drachms of diacodion was given him, which did not produce the effect
Five	There was not the least swelling of the face; his pulse was quick and full, his heat intense, and the delirium not abated. Wherefore he was ordered another bleeding; the nitrose draughts were continued, with the addition of five grains of myrrh to each; as likewise barley-water with spirit of vitriol, and the paregoric as before
Six	No notes recorded
Seven	The appearance of the disease was still the same, with the addition of an oppression of his breath, and a very troublesome dry cough. Diascordium was added to his nitrose draughts, and he was ordered a solution of gum ammoniac to be taken, a spoonful at a time, as occasion required; and the paregoric continued
Eight	He complained much of a most acute pain in his head; his shortness of breath and cough were increased, his pulse low, and there were no signs of suppuration; nor the least swelling in the face or hands: but the skin of his face looked like a piece of parchment. Blisters were ordered to be laid on his arms and legs, and plasters, made of equal parts of the cephalic and blistering plasters, to be wrapt round his feet: likewise draughts containing of mithridate half a drachm, and of volatile salt of amber half a scruple, to be taken every sixth hour; and a gargle of pectoral decoction, and oxymel of squills
Nine	No notes recorded
Ten	As every thing was grown worse, besides continuing the same medicines, blisters were ordered below the elbows
Eleven	His pulse being much lower, and the patient much weaker, a mixture with Raleigh's confection was ordered to be taken often by spoonfuls, and the other cardiacs continued
Twelve	The pulse being scarcely perceptible, and his breath oppressed to the last degree; when all hopes of success were given up, a fit of coughing, in which he was almost suffocated, brought on the spitting of a limpid, scetid humour, equal in quantity to a salivation raised by mercury. And this flux continued twelve days without any apparent abatement: from thence it gradually diminished for four days, when it

Table 2-2: Treatment notes on a fifteen year old boy who presented with malignant smallpox

<sup>50</sup> Spirit of Vitriol is a dilute sulfuric or sulfurous acid solution (see footnote 24 for this information)

<sup>51</sup> Jon Eklund, "The Incomplete Chymist: Being an Essay on the Eighteenth-Century Chemist in His Laboratory, with a Dictionary of Obsolete Chemical Terms of the Period", in *Smithsonian Studies in History and Technology*, 33, (Washington, DC: Smithsonian Institution Press, 1975), <http://www.chemteam.info/Chem-History/Obsolete-Chem-TermsTOC.html>, (accessed February 5, 2011).

	stopped entirely
<b>Thirteen</b>	No notes recorded
<b>Fourteen</b>	No notes recorded
<b>Fifteen</b>	No notes recorded
<b>Sixteen</b>	The disease, together with that discharge, had so far exhausted him, that he was scarce able to turn in his bed: and yet his spirits were so much better, that he could take plentifully of liquid nourishment. Whereby gathering strength, his fever had now the appearance of a hectic only; for which he was ordered to lose five ounces of blood, to take draughts of lemon juice, and salt of wormwood, with a little sperma ceti dissolved in them, every four hours, and to drink asses milk every morning
<b>Post-disease</b>	By this method, with the repetition of bleeding to five ounces two or three times, and now and then purging him gently with rhubarb; together with elixir of vitriol in Bristol water, and the country-air, he in time happily recovered

Table 2-2: Treatment notes on a fifteen year old boy who presented with malignant smallpox<sup>52</sup>

examples of the successful treatment. First Mead carefully examines the reasons why the sweating treatment does not work and how the heat adversely affects the body during the disease process. Then, he uses the case of a boy with malignant smallpox who was successfully treated to appeal to the public on the benefits of this treatment. The malignant smallpox is nearly always fatal but Mead found a case where the cool treatment was used and the patient was able to survive the ordeal. Cooling foods and medications were ordered but eventually the patient reached a point where the physicians expected him to die. Then hope was restored when it appeared that the treatments were working and more cleansing foods were ordered, along with a blood-letting. Using his reasoning on why the sweating treatment failed and his experience in the success of the cool treatment provided Mead with a solid argument in favor of the cool treatment.

The second description of the cooling treatment was written by John Thomson following his description of the successfully treated boy whose father had sent a record of his treatment to Dr. Monro. Thomson published his method of patient care in his 1824 book on a smallpox epidemic in Edinburgh, which presented many of the cases of smallpox which had appeared in Edinburgh, some

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<sup>52</sup> Mead, 35-38.



of which had been treated successfully while others had ended in death. According to Thomson's methods, "The treatment consisted of the two calomel purges, and the solution of Epsom salts... of cooling acidulous drinks, and of frequent sponging with vinegar and cold water; the tepid bath having been premised on the first attack. His room was kept as cool as possible, and his bedding consisted of a single sheet and light coverlet."<sup>53</sup> The cooling method as described by Walker and Thomson points out the central role of a cool and clean environment and a diet which encourages the body to maintain a cleansed condition.

A fourth author who discusses smallpox treatment in his publication is William Buchan, a fellow of the RCPE. According to Buchan, "All that is, generally speaking, necessary during the eruptive fever, is to keep the patient cool and easy."<sup>54</sup> Additionally, Buchan encourages parents to allow their children to move about as they are able and not to keep them confined in bed, as confining children to bed too early in the disease can prove detrimental.<sup>55</sup> Buchan also counsels the poor to avoid laying multiple children with smallpox in the same bed or even in the same room, "as the perspiration, the heat, the small, &c. all tend to augment the fever, and to heighten the disease."<sup>56</sup> Furthermore, Buchan stresses the need to keep patients on fresh linens and open air to aid the natural healing process.<sup>57</sup> The attention paid to the clean environment and fresh bedding emphasizes the growing understanding during the Enlightenment of the role the environment could play in festering disease.

In 1791, Alexander Aberdour was a surgeon in the port town of Alloa, Scotland. As the cool treatment became popular in Alloa, Aberdour attempted to determine why that method was more

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<sup>53</sup> Thomson, 352-353.

<sup>54</sup> William Buchan, M.D., *Domestic Medicine: or a Treatise on the Prevention and Cure of Diseases by Regimen and Simple Medicines with an Appendix, containing a Dispensatory for the Use of Private Practitioners*, fifth edition, (London, 1776), printed for W. Strahan, T. Cadell in the Strand, and J. Balfour and W. Creech at Edinburgh, Eighteenth Century Collections Online, Gale, University of Michigan, (accessed February 1, 2011), 234.

<sup>55</sup> Buchan, 235.

<sup>56</sup> Buchan, 236.

<sup>57</sup> Buchan, 236-237.

successful than alternative treatments. In a pamphlet published in Edinburgh to help describe smallpox and the practice of inoculation, Aberdour argues that the cool treatment “applied to the body checks the generation or progress of the variolous ferment, in the same manner as when cold is applied to fermenting wort or leavening bread, which stops, in a great measure, and more fermentation... when a child lay with one cheek upon the soft warm breast of its nurse, that cheek had many more pustules than the other, that was exposed to the cold.”<sup>58</sup> While Mead reasoned why the sweating method was less successful than the cooling method, Aberdour used observation to confirm this. His pamphlet, in combination with Mead’s, provided the Scottish populace with scientific analysis, composed of both empirical data and the underlying reasoning, behind the new method of treatment. This consideration was especially important during the Scottish Enlightenment when scientific methods were coming to dominant all fields of study.

However, despite the popularity of the cooling treatment, the response was not unanimous. Like most other medical theories of the eighteenth century, this theory aroused debate. Walker and Aberdour provide excellent examples of the differing opinions regarding this system of treatment. Walker, while finding the treatment useful in keeping patients comfortable during their disease, did not find that the cool method was any more successful at treating smallpox overall than other treatments, stating that it was “insufficient to subdue the dire symptoms attending that disease.”<sup>59</sup> Further adding proof to his argument, Walker adds, “I never was sensible, by the strictest attention to this regimen, of the crop of small-pox being lessened, for the pustules were often as numerous as the skin would admit of, with little or no remission of the eruptive fever.”<sup>60</sup> In the end, Walker

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<sup>58</sup> Alexander Aberdour, *Observations on the small-pox and inoculation : to which is prefixed a criticism upon Dr. Robert Walker’s late publication on the subject*, (Edinburgh, 1791), printed for J. Elder, University of Edinburgh Centre for Research Collections, Main Library – Special Collections, E.B. .6104/21/6, 37.

<sup>59</sup> Walker, 4.

<sup>60</sup> Walker, 224.

found that the cool regimen was able to comfort the patient but did not serve to actually lessen the course of the disease.

Conversely, Aberdour firmly believed in the benefits of the cool regimen. Aberdour's 1791 pamphlet argues in direct opposition to Dr. Walker's 1790 pamphlet. In his work on smallpox, Aberdour begins by criticizing Dr. Walker's view. Aberdour states:

I here again assert, that the Doctor [Walker] is wrong; and contend that the cooling regimen, observed in the strictest sense of the word, will not only prevent, but assist in diminishing the accumulation of the contagion. Baron Dimsdale, a man who, I believe, had much greater experience in this disease than the Doctor [Walker], was of this opinion, and accordingly has given an instance agreeable to my assertion.<sup>61</sup>

To further expand on the benefits of the cooling treatment, Aberdour points out that "By a warm regimen the patient is also affected with delirium, restlessness and fainting, which however, abate upon exposure to the cold air."<sup>62</sup> The cooling regimen and cold air, according to the belief held by Aberdour and the other supporters of this system of medicine, a belief which was held by a vast majority of Scotsmen who were publishing information on smallpox in Enlightenment Scotland, it provided relief to smallpox victims and alleviated their symptoms. Those who opposed the system sought for either a less extreme change or believed that it was comforting but not generally successful in combating the difficult-to-treat disease.

### ***THE PATIENT'S DIET***

The Baron Dimsdale mentioned by Aberdour was a well known British physician who was very prominent in the inoculation movement. Dr. Dimsdale was educated at King's College in Aberdeen and served as a physician to the Russian Court. In 1768, Dimsdale became one of Europe's foremost inoculators when he inoculated the Russian Empress, Catherine. Furthermore,

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<sup>61</sup> Aberdour, 17.

<sup>62</sup> Aberdour, 32.

Dimsdale published a treatise entitled *The Present Method of Inoculating for the Smallpox* which was published in 1767 and re-printed in seven editions and multiple languages.<sup>63</sup> This publication shaped much of the medical theory surrounding smallpox in the second half of the eighteenth century.

In his treatise, Dimsdale discusses not only inoculation and the cooling method but also the diet of smallpox patients. In addition to the debate between the sweating and cooling regimens, physicians found the diet to be of upmost importance in treating smallpox. Diet had long been a topic of consideration in treating many illnesses and smallpox was no different. However, here there was less debate, as the suggested diet was very similar between authors. According to Dimsdale, the diet differs based on the progression of the disease. Once a patient has reached “a disposition to receive nourishment hourly” then the patient is to be fed “thin mutton or chicken broth, milk pottage, or tea, as the most grateful and refreshing cordial sustenance they can take.”<sup>64</sup> Light foods which did not interfere with the body’s natural healing were encouraged.

Dimsdale was not the only physician to use diet to complement treatment. Many of the authors mentioned above published their suggested diets for smallpox patients in their treatises on treating smallpox. Robert Walker included cool fruits and subacid drinks in his instructions for the cooling treatment and John Thomson encouraged cooling acidulous drinks. Aberdour too discusses diet in his method for treating natural small-pox, stating, “with regard to diet, the most proper should be composed of vegetables and milk.”<sup>65</sup> In these cases, discussions of diet are short but emphasize the cooling nature of the food.

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<sup>63</sup> Philip H. Clendenning, “Dr. Thomas Dimsdale and Smallpox Inoculation in Russia,” in *Journal of the History of Medicine*, (April 1973), [jhmas.oxfordjournals.org](http://jhmas.oxfordjournals.org), (accessed February 1, 2011), 109-125.

<sup>64</sup> Thomas Dimsdale, *The present method of inoculating for the small-pox. To which are added, some experiments, instituted with a view to discover the effects of a similar treatment in the natural small-pox*, (London, 1772), printed for W. Owen, Fleet Street, Eighteenth Century Collections Online, Gale, University of Michigan, (accessed February 1, 2011), 67.

<sup>65</sup> Aberdour, 54.

However, perhaps the most detailed discussion of diet can be found in either Richard Mead's treatise on smallpox and measles or William Buchan's treatise on domestic medicine. In his chapter on curing the smallpox, Mead gave a complete list of dietary instructions for each segment of the disease:

With regard to diet, it ought to be very slender, moistening, and cooling; such as oatmeal or barley-gruel, &c. Nevertheless, as the food is to be adapted to the several stages of the disease, the best regimen in the beginning is that which will keep the body open, and promote urine. These advantages are obtained by boiling preserved fruits with their food, especially figs, damascene plums, and tamarinds; and giving them subacid liquors for drink; as small beer acidulated with orange or lemon juice; whey turned with apples boiled in the milk, or with wine; emulsions made with barley-water and almonds; Moselle or Rhenish wine plentifully diluted with water; or any other things of this kind.<sup>66</sup>

Once again, Mead proposed a diet which helped keep the patient cool and enhance their treatment. However, he did not only propose his own methods. As discussed in chapter one, Mead was influenced by the physicians in Arabia and benefited from the spread of knowledge during the Enlightenment. Further evidence of this can be seen in Mead's discussion of diet. Mead stated that when the diet he suggested "did not keep the body open, the Arabian physicians added manna to it; but this they did sparingly, and with caution. 'For it is quite necessary,' says Avicen, 'that the body be open in the beginning.'"<sup>67</sup> According to Mead, a diet which kept the body open and encouraged the evacuation of fluids, and with them the disease itself, from the body was "one of the most important advices that can be given in this disease."<sup>68</sup>

Similarly, William Buchan proposed a diet which was supposed to aid in treatment and maintain a patient's strength and comfort. Buchan instructed that "the food in this disease ought to be very light, and of a cooling nature."<sup>69</sup> Good examples of food which met this criteria included bread boiled in milk and water, apples roasted or boiled in milk and sweetened with sugar and other

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<sup>66</sup> Mead, 23-24.

<sup>67</sup> Mead, 24.

<sup>68</sup> Mead, 24.

<sup>69</sup> Buchan, 237.

light foods that were easy to digest.<sup>70</sup> Additionally, Buchan suggested several different drinks which were a good addition to the diet. Drinks which Buchan considered good for smallpox patients include watered-down milk, clear sweet whey, barley-water, and thin gruel for patients whose eruption had not come out yet, and butter-milk, which Buchan considered to be “of an opening and cleansing nature,” to be the drink of choice for patients after the pox erupted completely.<sup>71</sup> These dietary instructions were used to enhance the effectiveness of treatment and were seen as an excellent way to help a patient purge the smallpox from the body.

### ***MEDICATIONS***

In addition to the diet, the authors of the publication on smallpox provided many suggestions for medicines which could treat the specific complaints of smallpox sufferers. Following their discussion of diet, both Dimsdale and Mead discussed the different medicines which could benefit patients with smallpox. According to Dimsdale, during the height of the disease, when the patient’s stomach could not handle food, they were to be given cold water and liquids along with liquid medicines. There were multiple versions of the liquid medicines depending on the complaints of patient. For patients who had trouble regulating their bodily systems, they were to take “cream of tartar, two drachms; of manna, one ounce; dissolve them in one quart of barley water, or the pectoral drink” and take this combination regularly throughout the day to produce three or four regular stools a day.<sup>72</sup> For patients suffering from the most virulent stage of the illness, Dimsdale recommended a medicine to “abate heat, and allay thirst, in such a manner as to afford a very pleasing refreshment.”<sup>73</sup> Dimsdale instructed patients to “take of the weak spirit of vitriol one part, of the sweet spirit of vitriol two parts; mix. Of this the quantity of half an ounce may be added to a

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<sup>70</sup> Buchan, 237.

<sup>71</sup> Buchan, 238.

<sup>72</sup> Dimsdale, 79.

<sup>73</sup> Dimsdale, 72.

quart, or perhaps three pints of barley water, or the pectoral drink, or any other diluents, and to be drank of at pleasure.”<sup>74</sup>

Mead, too, suggested multiple medicines for the different symptoms of smallpox. For fever, Mead provides a medicine which, in his words, keeps “the inflammation of the blood within due bounds, and at the same time [assists] the expulsion of the morbid matter through the skin.”<sup>75</sup> This medicine was composed of “two parts of the bezoardic powder, and one part of purified nitre; and sometimes equal parts of both” where adults were to take half a drachm three to four times a day and children were to take doses which diminished in size in proportion to their age.<sup>76</sup> As another suggestion, Mead stated “if there be any heakings or retchings to vomit, they will be removed by draughts containing half an ounce of juice of lemons, with one scruple of salt of wormwood.”<sup>77</sup>

For those suffering from the form of smallpox known as the blood small-pox, Mead had yet another suggestion, calling for physicians to treat these patients with medicines which thicken the blood and prevent it from breaking through the small arteries. According to him, the best medications, based on his experience in treating smallpox patients, were the Peruvian bark, alum, and that spirit which is called oil of vitriol.”<sup>78</sup> To administer this, Mead says to give a drachm of the bark every six hours and three hours after this, to give “a proper quantity of alum”; this is to be combined with the oil of vitriol, of which five or six spoonfuls are to be administered several times a day.<sup>79</sup>

However, Mead had the strongest suggestions and cautions surrounding medications for pain. Beginning his section on pain and sleep management medications, Mead stated, “these are not to be used over-hastily: for all anodynes in some measure obstruct the separation of the morbid

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<sup>74</sup> Dimsdale, 72.

<sup>75</sup> Mead, 28.

<sup>76</sup> Mead, 28.

<sup>77</sup> Mead, 28.

<sup>78</sup> Mead, 31.

<sup>79</sup> Mead, 31-32.

humour from the blood, unless the pain happens to be excessive: and moreover, if the violence of the fever has raised a delirium, they generally make it worse.”<sup>80</sup> Additionally, Mead cautioned that the pain medications are not to be used until the pustule eruption has completed. However, once this time had been reached, patients could have a dose of “the thebaic tincture, or diacodion, every evening” unless they were an infant because these medicines are not agreeable to infants.<sup>81</sup> Despite these instructions, Mead added one more word of caution, saying that “if, towards the end of the disease, the patient happens to be seized with a shortness of breath, or danger of chocking from viscid slime, these medicines are to be entirely prohibited.”<sup>82</sup>

While William Buchan did not have suggestions for treating pain, he too had strong suggestions for treating the symptoms of smallpox. In his treatise on domestic medicine, Buchan divided the smallpox into stages and provided instructions for treatment of the symptoms of each stage. In addition to physical remedies such as bloodletting and walking, Buchan had different combinations which are suggested as medications for each symptom of the illness (as seen in Table 2-3).<sup>83</sup> As with both Dimsdale and Mead, Buchan used common ingredients as the basis of his medications, often basing his mixtures in wine or other liquid foods.

This breakdown of medicines by symptom shows an analytical approach to the medical treatment of the often deadly disease of smallpox. Buchan concentrated on maintaining the patient’s constitution during each phase of the disease. This analysis allowed Buchan to break down the disease into not just the symptoms but also the stages of the disease during which the symptoms would occur and how best to treat the symptoms in each of the stages. During the Enlightenment, physicians sought to classify diseases and their symptoms which allowed them to seek to treat as many details of the experience of the illness as possible. Adding to this, the

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<sup>80</sup> Mead, 29.

<sup>81</sup> Mead, 29.

<sup>82</sup> Mead, 29.

<sup>83</sup> Buchan, 239-240.



Stage of the Disease	Symptom	Medication
<b>Fever Preceding Eruption</b>	Nausea or inclination to vomit	Weak chamomile-tea or lukewarm water
<b>Eruption</b>	Low creeping pulse, faintishness, great loss of strength	Good wine with equal quantity of water and sharpened with orange juice, the jelly of currants, or the like; or wine-whey prepared the same as above with great care taken not to overheat the patient
	Restlessness	Opiates sparingly given; for infants, a teaspoonful of the syrup of poppies and for adults, a tablespoonful of the same
	Strangury or suppression of urine	If physical movements do not work, a teaspoonful of the sweet spirits of nitre may be occasionally mixed with the patient's drink
	Foul mouth and a dry and chapped tongue	Gargle water and honey sharpened with a little vinegar or currant-jelly
<b>Maturation of the Pustules</b>	Purple, black, or livid spots appear among the smallpox	Peruvian bark must be immediately administered in as large doses as the patients stomach can bear; for a child, two drams of the bark powder mixed in three ounces of common water, one ounce of simple cinnamon-water, two ounces of the syrup of orange or lemon, sharpened with spirits of vitriol and a tablespoonful given every hour and in adults, three or four spoonfuls administered every hour
	Lymphatic or crystalline smallpox	Peruvian bark, acidulated as in the previous entry
<b>Secondary Fever</b>	Patient's in need of purging	In young children, an infusion of fenna and prunes, with a little rhubarb and sweetened with coarse sugar, given in small quantities; children of five or six years of age take eight or ten grains of fine rhubarb in powder overnight and the same quantity of jalap in powder the next morning, wrought off with fresh broth or water-gruel, repeated three or four times, five or six days intervening between doses, with doses of this increased in proportion to age and constitution
	Imposthumes happen after the smallpox	Bring the imposthumes to suppuration by means of ripening poultices and then, after they have opened, purge the patient with Peruvian bark and a milk diet
	Cough, difficulty breathing, or symptoms of consumption	Send the patient to a place where the air is good and put on a course of asses-milk

Table 2-3: Medication for smallpox patients according to William Buchan<sup>84</sup>

medications proscribed by Buchan were designed to aid keeping the body cleansed and open, the same as the treatment procedures which composed the cooling treatment. Buchan sought to curb

<sup>84</sup> Buchan, 238-245.

restlessness, purge the body, prevent overheating, and maintain good air. He used his experience with smallpox to breakdown the medications in order to best treat each patient's individual experience.

### ***INOCULATION AND VACCINATION***

A final treatment option commonly discussed by physicians was pre-emptive treatments. Smallpox was one of the earliest diseases to witness the development of successful pre-emptive treatments which prevented the spread of the disease. As physicians continued to be dissatisfied with the results of the developing treatments for the disease itself, they sought to find a way to prevent the diseases before it started and found two possible prevention techniques in inoculation and vaccination. Inoculation involved making a small incision on a patient's limbs and then introducing material from the pus of the pock of another patient with a minor form of the disease to the open incision, thus allowing the patient to become infected with a minor and more controlled form of smallpox and thereby develop immunity from the disease for life.<sup>85</sup> Vaccination is the process of introducing cowpox or the vaccinia virus, rather than smallpox itself, directly into the body through injection to cause immunity and rarely results in infection with an active disease; however, this method of immunity, in contrast to that of natural immunity or inoculation, is not permanent and requires subsequent vaccinations to maintain immunity.<sup>86</sup>

In the early eighteenth century, smallpox inoculation came to England from Turkey and then quickly spread to Scotland and the continent, although the acceptance varied from location to location and controversy surrounded the procedure. Following inoculation was the development of vaccination by Edward Jenner in 1798, which was much less controversial and received widespread

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<sup>85</sup> Andrea A. Rusnock, *Vital Accounts: Quantifying Health and Population in Eighteenth-Century England and France*, (Cambridge University Press, 2002), 43.

<sup>86</sup> Donald R. Hopkins, *Princes and Peasants: Smallpox in History*, (University of Chicago Press, 1983), 7.

support from common people, physicians, and even governmental authorities. As will be further discussed in chapter three, which will analyze the development from inoculation to vaccination, these two procedures, despite similarities, received a vastly different response from the general Scottish population.

## **CONCLUSION**

The spread of knowledge through published material brought out the widespread discussion on the treatment of smallpox from the leading members of the medical community in Scotland. Opposing theories on the patient's environment came to the forefront of the medical discussion with the sweating treatment and the cooling treatment. However, the environment was only one area of discussion. Just as the discussion on causes had sought to discuss all aspects of the disease, the discussion of treatment sought to leave no individual symptom untreated. Diets for the different stages of the disease were prominent in the literature. Medications for each symptom of the smallpox were described and the minute instructions for their uses were elaborated. The details of care in the published literature sought to break the disease down into its component parts and treat each aspect through multiple areas of the patient's life.

The work of these published treatments represented the body of work of some of the leading physicians in Scotland. The members of the Royal College of Physicians and Royal College of Surgeons of Edinburgh along with the faculty of the Medical School at the University of Edinburgh had an international reputation and a growing influence. These institutions provided a source for the production and spread of knowledge while providing the authors with an international status as some of the foremost medical thinkers of their time. The discussions of the courses of treatment and the reasoning behind each of them, discussions held in the printed world by the leaders of the

Scottish medical community were excellent examples of the Enlightenment's approach to medical treatment and the conquering of a deadly disease.

## CHAPTER THREE

### A PRE-EMPTIVE STRIKE AND THE CULMINATING DEBATE

In 1979, after a thirteen year concentrated effort to rid the world of the disease which had ravaged nations for centuries the World Health Organization declared the worldwide eradication of smallpox.<sup>1</sup> But this was much more than the end of a thirteen year endeavor. This was the successful culmination of over two hundred years of work. In the early eighteenth century, the first efforts at a preventative treatment for smallpox reached England through the introduction of inoculation and the technique soon spread north to Scotland. However, medical innovation soon eclipsed the technique of inoculation with the discovery of vaccination.

The introduction of inoculation to Enlightenment Scotland ignited a fury of debate which raged in the published world for decades. As discussed in Chapter Two, inoculation was a procedure that infected a healthy individual with a minor form of smallpox through a contact with a small incision on the skin and thereby produced immunity for life. However, the safety and this process and its potential for success remained questionable. On the one hand, the practice of inoculation brought out fears and doubts across society as the dangers of the process became more well-known and the possible threats reached a greater audience. On the other hand, prominent members of the medical community and religious community supported the practice and sought to relieve the fears and quiet the naysayers. For the entire second half of the eighteenth century, inoculation remained a controversial procedure

However, unlike inoculation, the introduction of vaccination was well received. Published information on vaccination tended to be one-sided. Like, inoculation, vaccination involved

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<sup>1</sup> D.A. Henderson, "A Victory for all Mankind," in *World Health*, (May, 1980), 5.

introducing viral material into a healthy person; however, in vaccination, the material that was introduced was a modified version of cowpox and it was injected into the body. The downside to vaccination was its effectiveness, as vaccination did not produce life-long immunity. However, this potential pitfall did not interfere with the quick rise in popularity towards vaccination. Both the medical establishment and the government were quick to jump behind vaccination and provide it with intense support. In the end, inoculation, a technique which received intense scrutiny but never achieved universal acceptance, quickly gave way to vaccination, which rose in prominence without the level of intense study that had accompanied inoculation.

### ***THE FIGHT OVER INOCULATION***

In 1714, Dr. Emanuele Timoni from Italy sent a letter to Dr. John Woodward in London. In the letter, which Woodward read to the Royal Society in London in 1716, Timoni described a new practice which he called inoculation.<sup>2</sup> According to Timoni, “The method of operation is thus: - Choice being made of a proper contagion, the matter of the pustules is to be communicated to the person proposed to take the infection; whence it has been metaphorically called infusion or inoculation.”<sup>3</sup> However, inoculation did not take hold in Britain until 1721, when Lady Mary Wortley Montague brought the practice back from Constantinople, after having served there as the wife of the British ambassador. According to a letter dated 1717 written by Lady Montague to a friend back in England, she was “patriot enough to take pains to bring this useful invention into

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<sup>2</sup> Donald R. Hopkins, *Princes and Peasants: Smallpox in History*, (University of Chicago Press, 1983), 47.

<sup>3</sup> William Woodville, M.D., *The History of the Inoculation of the Small-pox, in Great Britain; Comprehending a Review of all the Publications on the Subject: with an Experimental Inquiry into the Relative Advantages of Every Measure with has been deemed Necessary in the Process of Inoculation*, Vol. 1, (London, 1796), printed by James Phillips, George-Yard, Lombard-Street, Eighteenth Century Collections Online, Gale, University of Michigan, (accessed March 11, 2011), 67.

fashion in England.”<sup>4</sup> In April of 1721, she succeeded when she had her physician from Constantinople inoculate her young daughter after she returned to England. News of the procedure soon spread to the royal family, who, just months later, allowed Lady Montague’s physician, Dr. Charles Maitland, to conduct a trial at Newgate Prison.<sup>5</sup> Within the next year, the royal family had adopted the practice with the inoculation of the Prince of Wales’s children, a process which began the spread across England.

Smallpox inoculation came slightly later to Scotland and did not receive as strong a start. Inoculation arrived in Scotland in 1726 but failed to take hold when one of the first ten inoculated children died soon after the procedure.<sup>6</sup> By 1733, inoculation had begun to gain ground again in Scotland but by 1765, when the first Alexander Monro of the University of Edinburgh’s Medical School conducted a study to determine the prevalence of inoculation, the procedure remained in the minority. According to Monro, only a third of the medical practitioners in Scotland had adopted the practice and only 5,554 people had been inoculated.<sup>7</sup> While this is a substantial number, it represents only a miniscule portion of the population. According to Alexander Webster, whose *Account of the Number of People in Scotland in the Year 1755* is discussed in Chapter One, the population of Scotland around 1750 was 1.265 million people.<sup>8</sup> Given this size population, the proportion of inoculated individuals in 1765 represented less than one percent of the population. The low level of inoculation acceptance in Scotland following its introduction provided fuel for the debates which raged in the medical literature.

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<sup>4</sup> Hopkins, 48.

<sup>5</sup> Hopkins, 49.

<sup>6</sup> Deborah Brunton, “Smallpox Inoculation and Demographic Trends in Eighteenth-Century Scotland,” in *Medical History*, 36, (1992), 406.

<sup>7</sup> Brunton, 406.

<sup>8</sup> A. J. Youngson, “Alexander Webster and his ‘Account of the Number of People in Scotland in the Year 1755,’” in *Population Studies*, 15(2), (November, 1961), 200.

The increased need to break down a disease into its component causes which arose during the Scottish Enlightenment encouraged physicians to delve into smallpox in order to understand why it afflicted the population and how best to treat it. This was no different with preventative treatments. Alexander Aberdour, whose support of the cool treatment was discussed in the previous chapter, devoted the second half of his treatise on smallpox to dealing with inoculation. Based on Aberdour's instructions, there were seven things to consider when conducting an inoculation: the preparation, the condition of the body, the season of the year, the patient's age, the medical regimen, the disease matter chosen for the operation, and the method of performing the operation.<sup>9</sup> The process begins with eight days of preparation, where patients take a regimen of medications to prepare themselves for the inoculation. The operation was then performed on a young, healthy individual during a cool season. These conditions represented the two major areas of consideration in medicine: medical regimen (as discussed in Chapter Two), and the potential causes of disease (as discussed in Chapter One). Aberdour considers the age and constitution of the patient along with the season of the year important in preventing inoculation from producing a severe case of smallpox. Additionally Aberdour proposes a careful medical regimen to aid in man's ability to control the severity of disease.

Outside of the preparation and conditions for inoculation, the process was well defined by the time of Aberdour's publication. An inoculator begins by making a scratch on the arm, which is then stretched upon so that the disease matter can be rubbed off inside the wound. The process is then repeated to ensure success, as a successful inoculation does not always occur with one cut. If a large group is being inoculated, the disease matter will be applied to a cotton thread which can hold

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<sup>9</sup> Alexander Aberdour, *Observations on the small-pox and inoculation : to which is prefixed a criticism upon Dr. Robert Walker's late publication on the subject*, (Edinburgh, 1791), printed for J. Elder, University of Edinburgh Centre for Research Collections, Main Library – Special Collections, E.B. .6104/21/6, 67.



more disease matter in order to aid in large scale inoculations.<sup>10</sup> Eight days following the procedure, the patient developed what was usually a very mild form of the smallpox, although in some cases, it could be more dangerous. The detailed description of the process and each possible eventuality indicate how much effort medical practitioners had put into understanding inoculation and finding the best method for its application.

### ***WHO LIKED IT AND WHO DID NOT***

Despite the attention given to smallpox by physicians and other medical practitioners, this did not mean that smallpox inoculation was universally accepted. Overall, Scotland achieved a lower level of acceptance than England, despite the increased spread of medical knowledge across Scotland during the Enlightenment and the prominence of medicine in the Scottish intellectual scene. Deborah Brunton argues that the lower level of inoculation in Scotland was due to differences in the social status structure in Scotland, the regional epidemiology of smallpox, the availability of free inoculation, and the unique religious and moral objections of the Scottish church.<sup>11</sup> The objections to inoculation were varied, just as the arguments surrounding the treatment options in Chapter Two varied.

Using the *Old Statistical Account of Scotland*,<sup>12</sup> Brunton examines the regional acceptances of inoculation. She found it to be most common in Orkney, Shetland, the Outer and Inner Hebrides and in Argyll, as well as along the counties which bordered England (see Figure 3-1).<sup>13</sup> It was in these regions where smallpox often posed the greatest danger and was most often fatal. However,

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<sup>10</sup> Aberdour, 89-90.

<sup>11</sup> Brunton, 401-414.

<sup>12</sup> The *Old Statistical Account of Scotland* was a document compiled by Sir John Sinclair under the auspices of the Church of Scotland which was composed of the responses of the ministers of Scotland's parishes to a questionnaire sent out in the early 1790s, dealing with many aspects of life in Scotland, including population, religion, disease, economy, and geography (see footnote 6 for the source of this information).

<sup>13</sup> Brunton, 419-420.

smallpox inoculation remained unpopular through central Scotland, along the southeastern coast and in the western Lowlands (see Figure 3-2) where the physical and demographic conditions of Scotland discouraged the establishment of severe, endemic smallpox.<sup>14</sup> Rather, these regions more commonly faced intermittent epidemics which were not regular enough to induce the populace to accept inoculation.

Within the areas where inoculation was practiced, although not universally, the differences often fell along class lines. In the parish of Eaglesham in the county of Renfrew, the parish minister wrote that “the small-pox carry off great numbers of children: but there is no reconciling the minds of the lower ranks to inoculation.”<sup>15</sup> According to the parish minister in Hamilton in the county of Lanark, inoculation was practiced but “the common people are not reconciled to it.”<sup>16</sup> However, despite the religious objections eluded to by Brunton, the ministers of the Church of Scotland sided with the medical community in supporting the practice of inoculation. In fact, in the parish of Newabbey in the county of Kirkcudbright, the ministers found inoculation to be so important that the ministers began to perform the operation with good success amongst their parishioners.<sup>17</sup> While the educated often supported the practice, the laymen continued to struggle with the acceptance of this new and often poorly understood operation.

However, one area where the practice usually found unanimous support was among the medical community. Alexander Monro *primus* published *An Account of the Inoculation of Small Pox in Scotland* in 1765 where he discussed the medical community’s response to smallpox. This treatise, which was published in response to a series of questions posed to him by the Medical Faculty of Paris and circulated through the Enlightenment’s Republic of Letters between the leading

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<sup>14</sup> Brunton, 420-421.

<sup>15</sup> Sir John Sinclair, ed., *The Statistical Account of Scotland, 1791-1799*, Vol 2, (Wakefield, England: EP Publishing Limited: 1983), 119.

<sup>16</sup> Sinclair, 183.

<sup>17</sup> Sinclair, 126.



Figure 3-1: Parishes where inoculation was popular<sup>18</sup>

Intellectuals of the era. As the chair of anatomy at the Medical School of the University of Edinburgh and a fellow of the RCPE, Monro had an excellent position to judge such opinion given his well-respected position in the medical community. In speaking of the fatality of the natural

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<sup>18</sup> Brunton, 418.

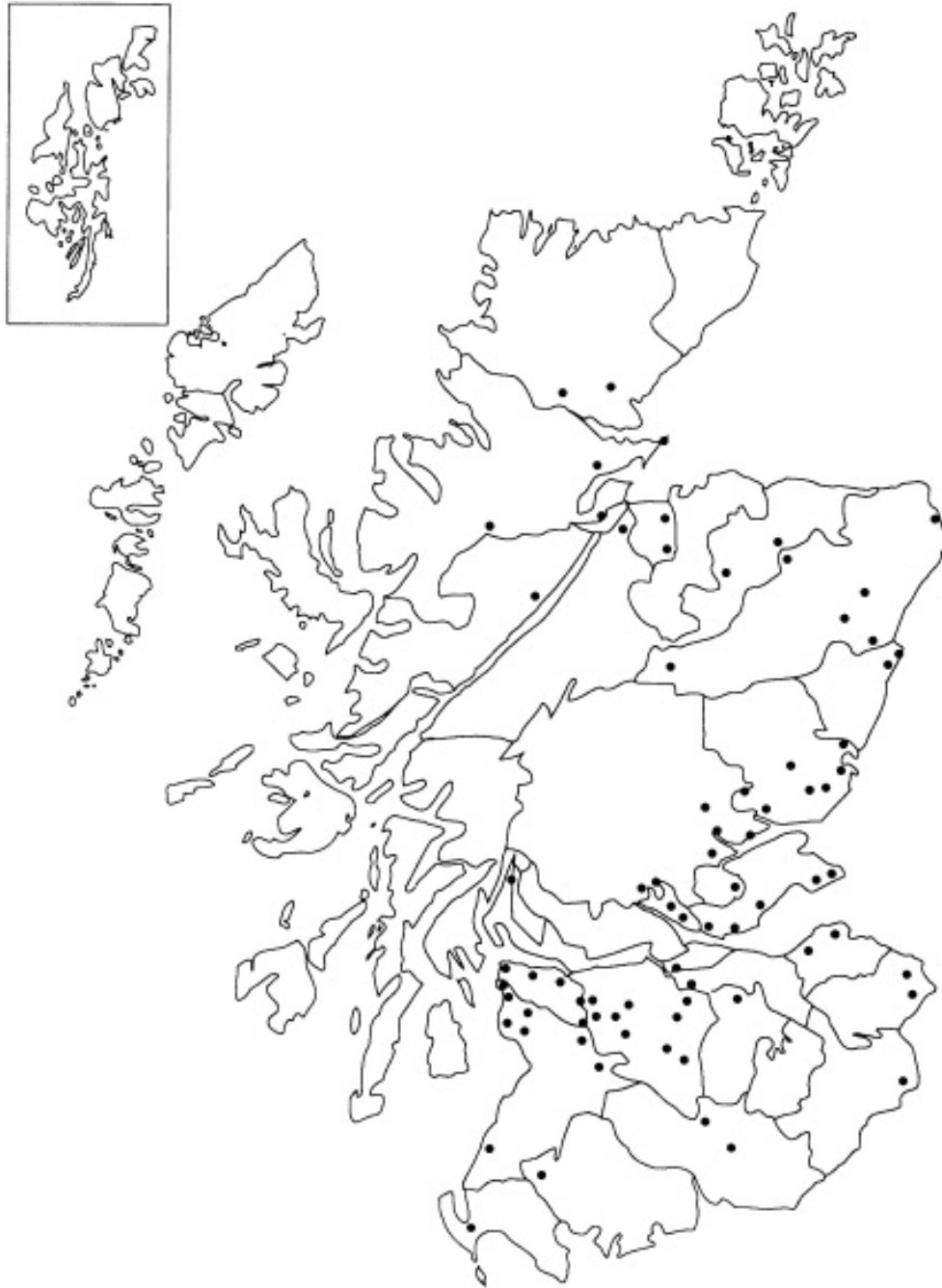


Figure 3-2: Parishes where inoculation was unpopular<sup>19</sup>

smallpox as compared to the benefits of inoculation, Monro states that he hopes that the clergy of the Church of Scotland would join in “the same public spirit as the medical gentlemen” in supporting

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<sup>19</sup> Brunton, 419.

the public good.<sup>20</sup> As the medical community joined together and disseminated information to the public in order to allay the fears of the Scottish populace.

### ***THE FEARS***

In the eighteenth century, smallpox was still a mystery, despite the continual search for a cause brought out during the Enlightenment. Inoculation was no different. There was no understanding of the difference between the *Variola major* and *Variola minor* viruses and inoculators were not always able to ensure a minor form of the disease when inoculating. Many things could go wrong in an inoculation and the possible uncertainties brought out the innate fears of the unknown in populations. But the Enlightenment's effects were not escaped by those who feared the unknown. Rather, the Enlightenment's push for the spread of knowledge gave the opponents of inoculation a voice for their fears.

In the *Statistical Account of Scotland*, the parish minister of Torthorwald in the county of Dumfries outlines one of the greatest fears facing the opponents of inoculation: the fear of introducing a smallpox epidemic where it would not naturally be. In his account, the minister states that:

In 1776, inoculation was first introduced into [his] parish, and that practice has since been continued, always with safety to the persons inoculated, though fatal to those who were infected by it in the natural way from the inoculated. Hence in twelve years preceding 1776, only two persons died here of the small-pox, whilst in twelve succeeding years, twelve were carried off by that disease. This tends to prove the necessity of making the practice of inoculation as general as possible, where it is at all adopted, otherwise it may be productive of harm, instead of good.<sup>21</sup>

As Torthorwald's minister attests, smallpox inoculation could be a dangerous endeavor and needed to be practiced with care. By bringing in smallpox matter to a community that was previously free of

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<sup>20</sup> Alexander Monro, *An Account of the Inoculation of Small Pox in Scotland*, (Edinburgh, 1765), printed for Drummond and J. Balfour, Eighteenth Century Collections Online, Gale, University of Michigan, (accessed March 17, 2010), 12.

<sup>21</sup> Sinclair, 12-13.

smallpox, the disease could spread to those who were unaffected but still susceptible. A close observation and analysis of the procedure introduced many to the danger of spreading smallpox rather than preventing it.

Furthermore, the minister of Torthorwald was not the only one to see these possible dangers within the inoculation process. Robert Cowan, whose *Vital Statistics of Glasgow* was discussed in Chapter One, reasons that inoculation has actually increased the overall fatality of smallpox in Glasgow. As Cowan argues:

The introduction of inoculation, although it diminished the relative mortality, will, it is believed, be found to have increased the absolute mortality of small-pox; as by this practice the disease, which, before its introduction, occurred epidemically only at long and uncertain intervals, was kept constantly prevailing at all times and seasons, thereby producing a mortality, especially among children, which could now be scarcely credited, but for the attested registers of its ravages.<sup>22</sup>

Rather than focusing on the specific fatality of the individuals who contract smallpox from those who have been inoculated, Cowan looks at the overall effects. Using his statistics, which were discussed in Chapter One, Cowan found that inoculation raises the overarching death rate, regardless of the individual death rate of inoculated patients. Under his reasoning, even if those who are inoculated experience fatality much less than that of the natural smallpox, inoculation introduces more people to smallpox which, in turn, brings more deaths, leading to a general increase in mortality.

Moreover, much of the Scottish populace feared tempting the wrath of God through inoculation. The Church of Scotland witnessed a surge of religious piety in the second half of the eighteenth century, following the Great Awakening of 1745. The Church of Scotland was composed mainly of four theologies, which included strict Calvinism, Evangelical Calvinism, liberal Calvinism,

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<sup>22</sup> Robert Cowan, *Vital Statistics of Glasgow: I. Statistics of fever and small pox prior to 1837. II. Statistics of fever for 1837. III. Remarks suggested by the mortality bills*, (Glasgow: David Robertson, 1838), (Edinburgh: Adam and Charles Black, 1838), University of Edinburgh Centre for Research Collections, Main Library – Special Collections, P .198/11, 27.

and Arianism.<sup>23</sup> Within the Calvinist aspects of the Church, the idea of God's role in everyday life was an important aspect of religious life. This aspect was furthered by the Enlightenment belief in divine law and man's search to understand it. However, it was these ideas which created some of the strongest objections from the laymen of Scotland to inoculation. According to John Andrew, a Scottish inoculator, "The chief argument urged by...Parents, against this Practice, it, that it brings a Distemper upon their Children, which they might never have, and that if any one of them should die, they should never forgive themselves, on Account of their having (as they term it) presumptuously tempted Providence."<sup>24</sup>

This sentiment was echoed in the *Statistical Account of Scotland*, when the parish minister of Eaglesham, who above said that the lower ranks of the population would not support inoculation. According to the minister, "The thoughts of bringing trouble on their children... with their own hands, outweigh every argument that can be advanced in its favour."<sup>25</sup> Smallpox was often characterized as a childhood disease and the medical community appealed to parent's insecurities when they attempted to instruct the populace on different treatment options. However, in the case of inoculation, this argument was a double edged sword, as parents worried about the possible dangers of inoculation. Despite the support given to inoculation by parish ministers, the general membership continued to struggle with the possible negative implications of the practice.

### **THE BENEFITS**

However, in perhaps no other area was the effect of the Enlightenment seen in greater force than in the publications by the proponents of inoculation. Here, leaders of the medical

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<sup>23</sup> R.A. Houston and W.W.J. Knox, *The New Penguin History of Scotland: From the Earliest Times to the Present Day*, (New York: Allen Lang the Penguin Press, 2001), 306.

<sup>24</sup> John Andrew, *The practice of inoculation impartially considered; its signal advantages fully proved; and the popular objections against it, confuted; in a letter to Sir Edward Wilmot*, (Exter: J. Spencer, 1765), University of Edinburgh Centre for Research Collections, Main Library – Special Collections, H. 23.79/2, 24.

<sup>25</sup> Sinclair, 119.

community sought to break down the opposition to the procedure and counter each argument with reasoning and evidence from observed and successful inoculations. In many cases, the arguments of the medical leaders were successful and scientific and their reasoning prevailed among many who came into contact with the publications. William Cholwich, a father who had his children inoculated after some consideration, wrote to his brother in Exter that he was “upon the whole... convinced, the Method of Inoculation is a very safe and useful Practice.”<sup>26</sup> Additionally, Alexander Monro *primus* wrote that “the greater number of the gentry, and most of the medical gentlemen” were convinced by the argument that inoculation saved children’s lives and neglecting to inoculated was against the public good and therefore had their children inoculated.<sup>27</sup> Monro’s analysis of the popularity of inoculation indicated that those who had the best access to the medical literature – the medical community itself and the gentry, who possessed the best education along with access and means to obtain the literature – were obtaining the pamphlets and following the leading advice articulated by the authors.

Seeking to appeal to an Enlightened view of medicine, the authors of pro-inoculation pamphlets argued their points with reasoning and evidence. As John Haygarth, a fellow of the Royal Society and Royal Medical Society of Edinburgh, put it, “rational measures which can be proposed to remove or diminish so great a calamity” as the smallpox must be encouraged.<sup>28</sup> Monro illustrated the role reasoning and evidence had in convincing the populace to adopt inoculation when discussing what he viewed as the “most general prejudice” against inoculation. He pointed out in his account of inoculation in Scotland, that parents often overcame their fear of tempting God’s

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<sup>26</sup> Andrew, 10.

<sup>27</sup> Monro, 6.

<sup>28</sup> John Haygarth, M.B., *A Sketch of a plan to exterminate the Casual Small-pox from Great Britain; and to Introduce General Inoculation: to which is added, a Correspondence on the nature of Variolous Contagion, with Mr. Dawson, Dr. Aikin, Professor Irvine, Dr. Percival, Professor Wall, Professor Waterhouse, Mr. Henry, Dr. Clark, Dr Odier, Dr. James Currie: and on the best means of Preventing the Small-pox, and promoting inoculation, at Geneva; with the Magistrates of the Republick*, Vol. 1, (London, 1793), printed for J. Johnson, Eighteenth Century Collections Online, Gale, University of Michigan, (accessed March 31, 2010), v.



providence (as discussed above) through two arguments. The first occurred when inoculation was conducted successfully on other families in the neighboring areas, providing evidence that the process was safe and advantageous. The second argument was one of reasoning; Monro pointed out that parents who had already lost children to the natural small pox would consider “the probable advantages which artificial infection, by *giving the choice of the age and state of the patient, of the season, and the management as to diet, exercise, &c. before the small pox form*, has over the common natural way of catching this disease.”<sup>29</sup> Furthermore, John Andrew twisted the argument around, stating that “Providence has given us *Reason* to discover what is most for our advantage, and has furnished us with a *Power* to execute it.”<sup>30</sup>

In this way, members of the medical community, with the eminent Dr. Monro prominent among them, countered each of the prejudices against inoculation with a reasoned and evidenced based account of the benefits of inoculation. A common concern addressed by the proponents of inoculation was that it was not possible to avoid the smallpox. Those who feared inoculation often suggested that not everyone came down with smallpox and many areas of Scotland went years without a case of the disease. However, as both Andrew and Monro argued, this was not a practical fear. Using deductive reasoning, Monro stated that “since very few of mankind now escape this disease, it must, sooner or later, come to every place.”<sup>31</sup> Furthermore, Monro points out that, as smallpox must come to every community at some point in time, introducing it into the community through inoculation is more favorable to allowing the natural smallpox to devastate the population, as inoculation allows the Scots to control the type of smallpox and the season in which it was introduced. Controlling the season was important in Enlightenment Scotland, as the study of weather and its effects on disease were often considered to be an important and new aspect of

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<sup>29</sup> Monro, 5.

<sup>30</sup> Andrew, 25.

<sup>31</sup> Monro, 7.

science. John Andrew, like Monro, argued that smallpox was unavoidable. However, Andrew employed population statistics as his method of evidence, a method which was growing quickly during the Enlightenment. According to Andrew, “there is scarce *one in a thousand* that escapes [the smallpox]... and that at least one in five dies.”<sup>32</sup> This means that, in Andrew’s opinion, “inoculation, by infecting a Town with the Small-pox... at least one-half of those who would probably die of that Disorder will be preserved, and consequently, though some individuals may suffer, the community in general will reap a Advantage.”<sup>33</sup>

Similarly, Monro makes use of the rising prominence of population statistics to argue that, unlike argued by some of its opponents, inoculation does not decrease fatality. While the opponents of inoculation claim that the number of deaths due to smallpox had increased since the introduction of inoculation, Monro maintains that this is not the case. To argue his case, Monro presents a table of smallpox fatality in Edinburgh from 1744 to 1763 (See Table 3-1). In the table, the overall proportion of deaths from smallpox did not increase between the decade before inoculation was practiced and that after inoculation was practiced. Monro stated that, considering only 713 people had been inoculated in the years from 1754 through 1763 and of those, only ten had died, “there have been 1185 burials of those who died of small pox during the years when inoculation was most frequent; which [shows] that a very small proportion of those who had small pox was inoculated.”<sup>34</sup> Furthermore, Monro argues that where inoculation was successfully practiced, fatality actually decreases. He sees this as one of the greatest advantages to inoculation. Once again, Monro employs numerical data to show this. After collecting data from any medical practitioners who performed inoculation in Scotland, Monro says that “scarce in one of

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<sup>32</sup> Andrew, 26.

<sup>33</sup> Andrew, 42.

<sup>34</sup> Monro, 11.

Years.	Total of Burials.	Dead of Small Pox.	Years.	Total of Burials	Dead of Small Pox.
1744	1345	167	1754	1215	104
1745	1463	141	1755	1187	89
1746	1712	128	1756	1316	126
1747	1200	71	1757	1267	113
1748	1286	167	1758	1001	52
1749	1132	192	1759	1136	232
1750	1038	64	1760	1123	66
1751	1241	109	1761	903	6
1752	1187	147	1762	1305	274
1753	1105	70	1763	1160	123
	<hr/>	<hr/>		<hr/>	<hr/>
	12709	1256		11613	1185

Table 3-1: Number of deaths from smallpox and the total number of deaths in Edinburgh, taken from the work of Dr. Monro, where the column on the right represents the ten years before inoculation was practiced and the column on the left represents the ten years after inoculation was practiced but before it was generally performed

seventy-eight dies of small pox” when artfully inoculated, while “the proportion of deaths, to those who recover of small pox taken by the common natural infection... we see that one of six dies.”<sup>35</sup>

In the end, inoculation was never widely accepted among the Scottish populace but it did receive strong support from the medical community. Both the general inoculators (Alexander) and the respected medical authority (Monro) sought to reassure the Scottish population of the potential benefits of inoculation. Alexander and Monro were able to use numerical arguments to aid in the spread of inoculation in Enlightenment Scotland. The Scottish Enlightenment encouraged the spread of medical knowledge in Scotland and the debates surrounding inoculation provided an excellent source for analyzing the role of reasoning, experiential evidence, and how social concerns

<sup>35</sup> Monro, 30.

impacted Scotland's understanding and acceptance of new and sometimes poorly understood advances in medicine.

### ***A POPULAR DISCOVERY: VACCINATION***

Unlike inoculation, which ignited a prolific debate, vaccination witnessed no such controversy. By the time vaccination came into consideration, the Enlightenment was over. However, the ideas of the Enlightenment remained prominent. The publication of materials seeking to educate the public continued to penetrate society in Scotland and within them, reasoning, numerical arguments, and the deep desire to understand the details of the disease. In the end though, vaccination became much more popular than inoculation as the populace gained a better understanding of how it worked and the potential risks.

Unlike inoculation, which introduces live variola virus into the patient's body, vaccination makes use of the vaccinia virus, or the cowpox virus. In 1798, Edward Jenner introduced the world to a procedure known as vaccination. After observing that those who had suffered from cowpox did not contract smallpox after inoculation, Jenner proposed the idea that the cowpox protected people from the smallpox. In his pamphlet which announced his discovery, he developed the phrase "variolae vaccinae" or smallpox of the cow to describe the infection, a term which evolved into the term vaccination.<sup>36</sup> Like inoculation, vaccination introduced the virus directly into the body but unlike inoculation, the vaccinia virus rarely resulted in any infection. However, while inoculation resulted in a lifetime of immunity, vaccination was not permanent and often required subsequent vaccinations to maintain immunity.<sup>37</sup> Despite this negative aspect of vaccination, Jenner had complete confidence in his discovery. Within a few years of announcing his discovery to the world,

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<sup>36</sup> Hopkins, 79.

<sup>37</sup> Hopkins, 7.

Jenner declared that, “the annihilation of smallpox – the most dreadful scourge of the human race – will be the final result of this practice.”<sup>38</sup> Two centuries later, Jenner’s prediction came true.

While vaccination had its problems, the hesitation of the Scottish population to accept inoculation was not carried over to vaccination. Rather, vaccination was readily accepted. In fact, all of Britain was much more accepting of this method of fighting the smallpox. Here, “the College of Physicians [of London] acted with extraordinary promptitude... Having corresponded with the Colleges of Physicians in Dublin and Edinburgh and with the Colleges of Surgeons of London, Dublin, and Edinburgh, and with other societies established for vaccination... the College of Physicians [felt] it their duty strongly to recommend the practice of vaccination.”<sup>39</sup> All of the medical institutions throughout Britain, not just in Scotland, joined together to advance this new development which had come out of Enlightenment medicine.

In Scotland, the adoption of vaccination was both rapid and successful. The effect was so fast that, in 1801, smallpox was still causing eighteen percent of all deaths but, in 1811, smallpox was only causing four percent of the deaths in Scotland.<sup>40</sup> In fact, Scotland’s acceptance of vaccination was so complete that by the smallpox pandemic of 1870-1875, Scotland had instituted a compulsory vaccination law; this law brought Scotland, along with the other countries with compulsory vaccination, mortality rates approximately one-third those of countries without these laws.<sup>41</sup>

The use of numerical data to prove the effectiveness and safety of vaccination was an important method which continued on from the Enlightenment. Robert Cowan, who used numerical data in opposition to inoculation, used it in support of vaccination. While Cowan

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<sup>38</sup> Hopkins, 80.

<sup>39</sup> J.A. Dudgeon, “Development of Smallpox Vaccine in England in the Eighteenth and Nineteenth Centuries,” in *The British Medical Journal*, 1(5342), (May, 1963), 1368.

<sup>40</sup> Brunton, 425.

<sup>41</sup> Hopkins, 91.

acknowledges that it is possible to get the smallpox after having been vaccinated, he maintains that it is a significantly less severe form and is not fatal. Using data regarding the number of deaths from smallpox before the age of five and after the age of five, Cowan declares that vaccination is a successful practice as the number of deaths in those above the age of five were significantly less numerous, indicating the vaccinated adult population was able to survive the smallpox.<sup>42</sup> Furthermore, Cowan uses the data from his own patients to prove that smallpox is not fatal in those who are vaccinated (see Table 3-2). Cowan points out that fifty-five individuals had been vaccinated

	Highlanders	Lowlanders	Irish	Total
<b>Males</b>	34	11	4	49
<b>Females</b>	36	10	0	46
	70	21	4	95
<b>Males Vaccinated</b>				32
<b>Females Vaccinated</b>	17	6	0	23
<b>Males Dead</b>	9	3	1	13
<b>Females Dead</b>	10	3	0	13

Table 3-2: Origin and vaccination status of 95 patients treated by Dr. Cowan in 1836<sup>43</sup>

and that “No death occurred in any individual who presented the appearance of having been properly vaccinated.”<sup>44</sup> In this way, Cowan found vaccination to be a great service to mankind and worked to convince the Scottish population of this fact.

Furthermore, scientific reasoning was an important part of spreading the word about vaccination. In 1809, the Edinburgh Vaccine Institution, which was established in 1801 to vaccinate the Edinburgh populace,<sup>45</sup> published a report to counter one of the few pamphlets which was published in opposition to vaccination. The chief arguments against vaccination center around the complaint that vaccination is not yet well enough understood (as understanding the nature of a

<sup>42</sup> Cowan, 49.

<sup>43</sup> Cowan, 30.

<sup>44</sup> Cowan, 30.

<sup>45</sup> WM. Farquharson, President of the Royal College and Incorporation of Surgeons of Edinburgh, “Letter No. IV, Edinburgh, March 3d, 1807,” in *Report of the Royal College of Physicians of London, on Vaccination, in The European Magazine, and London Review*, 52, (July-December, 1807), printed for James Asperne, Google Books, (accessed March 27, 2011), 224.

disease and its treatments was an important legacy of the Enlightenment) and around the previously mentioned imperfection in vaccination, as it did not confer permanent immunity.<sup>46</sup> The Edinburgh Vaccine Institute countered these fears with rational observations and experiences with vaccination. The published report states that “In this investigation, [the surgeons] have found a great many of those who were vaccinated in the years 1801 and 1802... who have been frequently and freely exposed, and especially within these last six months, to the contagion of the natural smallpox, by playing, sleeping, and other wise mixing with children in all the different stages of that disease, without being infected.”<sup>47</sup> Furthermore, they find that children who were vaccinated and then, more than eight years later, inoculated with the smallpox continued to show no signs of smallpox.<sup>48</sup>

As their final argument, the surgeons of the institute record the story of a caring mother who initially opposed vaccination but soon came around to the operation:

The wife of a carter, residing at the Sheriff-Brae of Leith, brought a young infant to the Vaccine Institution to be inoculated with the cow-pox: She stated that the smallpox was very frequent in her neighborhood, and that she had within these few months lost a child by that disease: On being asked why she had not brought that child to be vaccinated long ago, (for the child was two years old when he died from the small-pox), she replied, with tears, and expressions of the deepest regret, that she certainly would have done so, for that she had other two who had been inoculated at this institution, one six and a half years ago, the other about four and a half years ago, but that she had heard some reports against the cowpox, and therefore had neglected in doing it; but she said, that now she, and all her neighbors, were convinced, in spite of the stories which were spread against the cowpox, that it certainly prevented the smallpox, because her two children who were vaccinated, as above mentioned, (and who, it will be observed, were both beyond Mr. Brown’s period of security against the epidemic smallpox), had slept in

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<sup>46</sup> Edinburgh Vaccine Institution, *Report of the surgeons of Edinburgh Vaccine Institution, containing an examination of the opinions and statements of Mr. Brown of Musselburgh, on vaccination; Drawn up at the desire of the managers, and published by their directions, for the benefit of the institution*, (Edinburgh, 1809), printed by A. Neill, Wellcome Library, (London), Closed Stores EPB Tracts, T.888.9, 1-2.

<sup>47</sup> Edinburgh Vaccine Institution, 33.

<sup>48</sup> Edinburgh Vaccine Institution, 32-33.

the same bed, eat out of the same dish, and used the same spoon as their brother, during the whole of his illness, and yet had entirely escaped the smallpox.<sup>49</sup>

In this description, multiple aspects of the societal response to vaccination arise. First, there is the fear of the unknown. Despite the production and spread of knowledge during the Scottish Enlightenment, the spread was sometimes uneven or incomplete, so that new medical procedures, even those as successful as vaccination, took some time to reach all segments of society. Second there is the need for proof that the procedure is not dangerous but rather beneficial. The woman in the description had had her older children vaccinated early on in the process, when the differences between vaccination and inoculation were still being understood (thus the misuse of the term inoculation to describe the process in her story). However, once it was understood that vaccination was a different process with different results than inoculation, the woman hesitated to subject anymore children to the procedure. This fear was alleviated when she found proof of vaccination's effectiveness: her vaccinated children survived without ever contracting the disease while her unvaccinated child contracted a severe form and died.

A third aspect comes from the Enlightened Scots desire to purge the globe of the dangers posed by smallpox. The Enlightenment brought about an increased understanding of the causes and cures for disease through the increased study and classification of disease. The woman and her neighbors above sought to protect their neighborhood from the dangers of smallpox and to protect their families. The surgeons of the Edinburgh Vaccine Institute sought to protect their fellow Scots through the increased availability of vaccination to the population. In the end, Scotland united behind vaccination and was one of the first countries to institute mandatory vaccination, along with the rest of Great Britain, placing Scotland at the tip of the sphere in the fight against smallpox.

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<sup>49</sup> Edinburgh Vaccine Institute, 33-35.



## **CONCLUSION**

Across Europe, debates raged over smallpox inoculation and vaccination in the eighteenth and early nineteenth century. In Scotland, that debate was taken up by the medical community as they sought to promote first inoculation and then vaccination. Using the tactics of Enlightenment science, medical authorities presented details on the benefits of inoculation and vaccination to counter the fears that were often deeply held by the general populace. Population statistics often proved one of the most effective methods of promoting the benefits of the new procedures. However, experiential evidence and reasoning were also necessary components of the process. In the end, Scotland did look on inoculation with more favorability than its European counterparts but before inoculation could become accepted by the majority of the general populace, vaccination came into the field and quickly replaced inoculation. Using many of the same methods, medical practitioners preached the benefits of vaccination and, after experiencing more than fifty years of Enlightenment medicine, this time, the population was quick to jump behind the new procedure.

While inoculation was more popular in Scotland than in other European countries or even in England, it was nowhere near fully accepted. Regional acceptance of inoculation varied, with the Highlands, Islands, and towns bordering England, three areas where smallpox often posed the greatest danger, generally accepting the operation. However, other regions continued to reject the introduction of inoculation due to fears of introducing smallpox into towns where it was often absent or of causing unnecessary death and disease. However, one area where smallpox inoculation received almost universal acceptance was among the medical community. Unlike in countries like France, where the medical community was split, Scotland's medical community united behind inoculation and sought to alleviate the fears of their fellow Scots through educating them.

Publications were numerous and expounded on the successes of inoculation and the statistical data which supported the procedure.

However, in the end, it was vaccination, not inoculation, which ultimately found a foothold among the general Scottish population. Here, the medical community sought to educate their countrymen but had much less to fight against. Once the procedure was understood as a much less dangerous alternative to inoculation, a procedure that had already gained a significant although incomplete amount of popularity, vaccination was readily accepted by a vast majority of the population. In the end, the Scottish Enlightenment provided the circumstances necessary for the Scottish population to obtain information on the newest medical treatments and ultimately allowed them to accept one of the most important innovations in the history of public health. The Scottish Enlightenment provided Scotland with the means to study disease, disseminate the information, understand the underlying causes and treatments for disease, and find and implement new ways of fighting a disease which had been the scourge of mankind for centuries.

## CONCLUSION

### FINDING A WAY TO END A DEADLY DISEASE

The eighteenth century represents a new period in history. Across Europe, the Enlightenment encouraged the widespread production of knowledge and the exchange of intellectual ideas between thinkers. This knowledge was made available for all who could read it with an increase in publications. In Scotland, many of these publications were from the medical community and within these, smallpox was a common topic of discussion. The large production of published materials provides modern historians with an intimate look into the field of medicine in Enlightenment Scotland. Furthermore, it provided a means for the eighteenth century medical community to engage in public debate over the advancing medical treatments in Enlightenment and Post-Enlightenment Scotland.

A central issue in the medical literature was educating the public on the emerging cool treatment. This treatment contradicted the existing sweating treatment in that it supported fresh air, cleansing foods, and clean linens, as well as purging of the body through vomiting, blood-letting, and regulated bodily functions, while the sweating treatment urged heat, closed windows, and purging the body through the sweat. The instructions set forth by the authors in the medical literature supported this treatment through their work on diet and medication. A diet full of foods to maintain an open body and a cool environment were described in great detail, ensuring that the literate public was able to carefully regulate their treatment. Adding to this detail was a set of instructions on how to medicate patients. The publishing medical community cautioned physicians to avoid the abuse of opiates but to prescribe medications that cleared the body of the symptoms

that prevented the body from healing. Finding an effective treatment against the smallpox was a priority for the Scottish medical community.

This priority arose out of the sheer devastation brought about by smallpox. While the disease came to Scotland after it had established itself in England, it became endemic to a wider area of Scotland than of England. In Scotland, it quickly became endemic in the Lowland cities and towns but its real devastation was felt in the Highlands and islands of Scotland, where it became established and then appeared regularly, often killing off a large percentage of the children in these regions. Smallpox killed one in six people in Scotland at the height of its reign and was a common fear parents held for their children's lives.

The accounts of Scotland are littered with references to the terror smallpox instilled in the people of Scotland. The *Old Statistical Account of Scotland* catalogues the effects of smallpox throughout the country. The Parish ministers recorded the effects of smallpox amongst their parishioners in their responses to Sir John Sinclair's questionnaires. In their responses, the ministers often report the status of smallpox inoculation in their parishes. As Deborah Brunton's article argues, the *Old Statistical Account* indicates that inoculation was common in the islands, border regions, and western coastal areas while parish ministers from the central belt and eastern coast reported that the practice had not been accepted by their parishioners. However, the ministers themselves supported inoculation and often had their own families inoculated, even when their parishioners disagreed with the operation.

Just as the parish ministers supported inoculation, so too did the medical community. Members of the medical community, from countryside inoculators to the Chair of Anatomy at the Medical School at the University of Edinburgh, one of the premier medical educations in eighteenth century Europe, put out pamphlets which expounded upon the successes and benefits of inoculation in an attempt to calm the fears of the public. At the turn of the nineteenth century, the medical

community united behind vaccination as it came to replace inoculation. Scotland was one of the first countries to institute a vaccination law and as the great success of vaccination became public, so too did the acceptance rate among the Scottish populace.

As vaccination became popular, Scotland took yet another step towards the end of the smallpox in Scotland. The fight began with a desire to identify the causes and classify the disease. This information was used by the medical community to create new and more effective treatments for smallpox. When inoculation was introduced to Scotland, this information was used by the medical community to develop the safest method of inoculating the Scottish population and then present the benefits to the populace. When vaccination was discovered, the same methods which had aided the Scotland's physicians in their previous endeavors in the fight against Scotland were used to support the practice of vaccination. In the end, the Enlightenment proved to be an important period in the fight against the Scottish smallpox.

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