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Pox Britannica: Smallpox Inoculation in Britain, 1721-1830

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Abstract

Inoculation has an important place in the history of medicine: not only was it the first form of preventive medicine but its history spans the so-called eighteenth century 'medical revolution'. A study of the myriad of pamphlets, books and articles on the controversial practice casts new light on these fundamental changes in the medical profession and medical practice. Whereas historians have associated the abandonment of old humoral theories and individualised therapy in favour of standardised techniques with the emergence of new institutions in the second half of the century, inoculation suggests that changes began as early as the 1720s. Though inoculation was initially accompanied by a highly individualised preparation of diet and drugs, more routinised sequences of therapy appeared the 1740s and by the late 1760s all inoculated patients followed exactly the same preparative regimen. This in turn made possible the institutionalised provision of inoculation, first through the system of poor relief, later by dispensaries and charitable societies. In addition, debates over inoculation reveal the disintegration of the old professional order and the struggles of the physicians--whose authority was based in individualised practice--to retain their monopoly of inoculation and their status as authorities on the practice. By the 1770s, the intellectual and professional leadership of the profession passed to a new generation of practitioners. The thesis ends with an assessment of the impact of inoculation on population growth and finds that it was not widely practiced and had, at best, a marginal effect on mortality.

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POX BRITANNICA: SMALLPOX INOCULATION IN BRITAIN, 1721 - 1830

DEBORAH BRUNTON

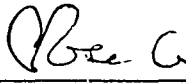
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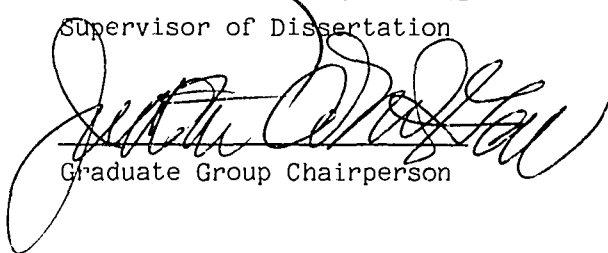
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Supervisor of Dissertation



Graduate Group Chairperson

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ABSTRACT

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DEBORAH BRUNTON

CHARLES E. ROSENBERG

Inoculation has an important place in the history of medicine: not only was it the first form of preventive medicine but its history spans the so-called eighteenth century 'medical revolution'. A study of the myriad of pamphlets, books and articles on the controversial practice casts new light on these fundamental changes in the medical profession and medical practice. Whereas historians have associated the abandonment of old humoural theories and individualised therapy in favour of standardised techniques with the emergence of new institutions in the second half of the century, inoculation suggests that changes began as early as the 1720s. Though inoculation was initially accompanied by a highly individualised preparation of diet and drugs, more routinised sequences of therapy appeared the 1740s and by the late 1760s all inoculated patients followed exactly the same preparative regimen. This in turn made possible the institutionalised provision of inoculation, first through the system of poor relief, later by dispensaries and charitable societies. In addition, debates over inoculation reveal the disintegration of the old professional order and the struggles of the physicians -

whose authority was based in individualised practice - to retain their monopoly of inoculation and their status as authorities on the practice. By the 1770s, the intellectual and professional leadership of the profession passed to a new generation of practitioners. The thesis ends with an assessment of the impact of inoculation on population growth and finds that it was not widely practiced and had, at best, a marginal effect on mortality.

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Preface : The Problem of Inoculation

Inoculation - the practice of deliberately infecting patients with smallpox, in the hope of producing a mild form of the disease - is often regarded as something of an oddity within eighteenth century medicine. It was the first - and for nearly eighty years the only - form of preventive medicine, and one of a handful of new treatments in a period usually characterised by its conservatism. Inoculation depended on inducing only smallpox, and therefore seems to sit uneasily against a background of medical theory which portrayed diseases as changeable, complex patterns of symptoms unique to each patients' constitution and circumstances. Not surprisingly, historians are divided in their opinions as to its importance. A few writers have echoed the eighteenth century belief that inoculation was a rallying point for, and one of the greatest achievements of, Enlightenment medicine. Most have been more cautious in their assessments, and see inoculation as a lucrative sideline for eighteenth century practitioners, rather than a part of mainstream practice. Historians of vaccination have largely dismissed the procedure as irrational and almost as dangerous as the natural disease.

These conflicting views reflect the fact that much of the history of inoculation in Britain remains unexplored - despite a wealth of eighteenth century source material including some two hundred pamphlets, and many references in periodicals, literary reviews, sermons, letters, newspapers and journals. Genevieve Miller's excellent book, published in 1957, covers only the introduction and the first three decades of practice. David van Zwanenberg has revealed the extensive practice run by the Sutton family in

the 1760s and 1770s. J. R. Smith has recently provided an excellent account of the use of inoculation in Essex. The extent of inoculation has also been examined by Peter Razzell in an attempt to assess its impact on smallpox incidence and hence on mortality and population growth. We are still without a general evaluation of this controversial procedure.

This thesis has two main objectives. Its primary aim is to present a history of inoculation in Britain from its introduction in 1721 to its decline in the 1820s and 1830s, exploring the development of inoculation techniques, and their adoption by both patients and practitioners. Second, it attempts to place inoculation in its eighteenth century context, to examine how the practice fitted with broader ideas of disease and therapy. Inoculation is thus a tool with which to explore the so called 'medical revolution of the eighteenth century'. In particular, it casts a new and revealing light on two neglected areas: therapeutics and the decline of the elite physician.

The picture of eighteenth century medicine which emerges from a study of inoculation is often surprising. Medical practice is usually reckoned to have changed very little before 1800. Historians have assumed that while the conservative physicians remained wedded to a theory and practice based on the classical concept of the body as a system of fluids or humours, attempts to advance medicine by applying the 'scientific' knowledge of mechanics and mathematics yielded little in the way of new therapeutics. They believe that a 'new medicine' did not appear until the second half of the century, with creation of institutions. In the new clinical setting, practitioners had the opportunity to study disease as a collective phenomenon. They developed pathological theories in which disease was located in the body organs, and a

newstyle of practice in which all patients suffering from the same condition were treated alike.

However, a study of texts on inoculation and smallpox shows that although there were no breakthroughs in terms of new treatments, the style of medical practice was going through fundamental changes as early as the 1720s. Physicians began to move away from highly individualised therapy, developing increasingly routinised methods of treatment in both smallpox and inoculation. This shift in practice, taken to its logical conclusion, eventually produced a technique for mass inoculation in which all patients were treated alike, not in an institution, but in private practice, initially by physicians, later by rank and file practitioners.

However, the physicians' eagerness to improve medicine created problems. Their formal status at the head of the profession, and their monopoly of practice in internal disease rested upon their superior knowledge of the body, and how it was affected by disease, climate, the patient's constitution and so forth. This knowledge was exemplified in their ability to prescribe courses of treatment tailored to the circumstances of each patient. The physicians led the way in developing methods of treatment, but they always had to retain some element of individualised practice, as a basis from which to defend their role in inoculation practice, and their status as a professional elite. This tension between conservatism and innovation was never resolved. Finally, the old elite literally died out, and their place was taken by a new generation of practitioners whose professional status was based in new institutions and new forms of practice.

The structure of the thesis is chronological, following developments in inoculation practice. Chapter one attempts to show that inoculation was in fact consistent with medical thought and practice. In the decade following its introduction in 1721, the near Eastern folk practice of inoculation was integrated into British medicine and rationalised in terms of established theories of smallpox. It was divided between different groups of practitioners according to the old tripartite division between surgeons apothecaries and physicians, and the techniques of inoculation, of preparing patients for inoculation, and of caring for inoculated patients were borrowed from the traditional practice of each group.

However, even as early as the 1720s, British medicine was entering a period of fundamental change. Chapter two explores these changes, which were to shape inoculation practice in the 1730s and beyond, through a study of smallpox texts published in the late seventeenth and early eighteenth centuries. They reveal how, in the 1720s, physicians developed new ideas of smallpox contagion and placed an increasing emphasis on the concept of a disease process common to all patients. This provided a foundation on which to construct ever more detailed methods of treatment. Instead of simply listing appropriate therapy, and leaving the individual physician to determine which were best suited to each case, writers laid out the correct sequence of therapy or methods adapted to the different forms of smallpox.

These changes were mirrored in the development of inoculation practice in the 1740s and 1750s. Whereas inoculators in the 1720s had prepared each patient using unique combinations of diet and medicines, inoculators in the 1750s grouped their patients according to constitution, and then applied

an appropriate method of preparation. However, as the physicians' monopoly of preparing patients was increasingly broken by the surgeons and apothecaries, they returned to their old defence, stressing the need for elaborate preparation. Although the physicians won some public support for their cause, the surgeons and apothecaries succeeded in capturing much of the expanding market for inoculation, inoculating not only among the middling classes, but also among the wealthy who had previously patronised physicians.

The conflict over inoculation practice came to a head in the late 1760s, when a family of provincial surgeons - the Suttons - took the trend of increasingly uniform methods of inoculation to its logical conclusion, and developed a completely standardised procedure. It proved immensely successful, much more so than any technique developed by the physicians. The old elite fought back. They recognised that their monopoly of inoculation had gone, but they struggled hard, and, to some extent, succeeded in regaining their position as authorities on inoculation. They adopted the Suttons' techniques but insisted on the need to adapt therapy to the individual patient - a compromise which preserved their reputation as innovators as well as their traditional learned status.

This standardised method allowed inoculation to move from a form of private practice - protecting individuals from the ravages of severe smallpox - into the realm of public medicine; the inoculation of large sections of the population provided a means of controlling outbreaks of the disease. The institutional history of inoculation is curious and well worthy of study. As J.R. Smith and Peter Razzell have noted, public inoculation flourished under

the old system of poor relief, although they have not explained why. Chapter five makes clear that long before the 1760s, parish authorities had developed a series of measures to deal with the spread of smallpox, and that inoculation fitted neatly into these existing measures. By contrast, the hospitals and dispensaries which provided care to the poor in cities proved ill-equipped to offer inoculation without endangering the public in general. The isolation of inoculated patients was expensive, and the inoculation of only part of the population was opposed by the conservative physicians for fear of spreading smallpox. This proved to be the elite physicians' last contribution to the debate over inoculation before the staff of the new institutions took over as authorities on inoculation.

This failure to provide inoculation through institutions led ultimately to the decline of the practice, and is examined in chapter six. Although modern writers suggest that vaccination was a great advance on inoculation, the two procedures were very similar. Jenner and later vaccinators simply substituted matter from a case of cowpox for that of smallpox. Nor did vaccination immediately supersede inoculation; although the new procedure was rapidly adopted by a large section of the medical profession, and the upper and middle classes, it was strongly resisted by some practitioners and by the poor. However, unlike inoculation, vaccination did not spread infection and vaccine institutions rapidly sprang up all over the country. As a result, the new procedure gained the support of the most powerful practitioners, who persuaded the government to take an interest in the procedure as a possible means of eradicating smallpox. Consequently, inoculation began to

decline in the 1830s, and in 1840, an act of parliament made the practice illegal.

Opinions are sharply divided over the impact of inoculation. Peter Razzell has claimed that inoculation was effective in reducing deaths from smallpox, and was one of the major factors in eighteenth century population growth. Other historians and demographers have dismissed its effect as marginal. The final chapter of this thesis tries to reassess the arguments, using a detailed study of inoculation in Scotland. It suggests that inoculation, though popular in the south of England, was still not well established in Scotland. The common people continued to reject the procedure on religious grounds. As a result, it had only a minor effect on smallpox incidence and contributed little to population growth.

Chapter One: The Introduction of Inoculation 1721-1729

The process by which inoculation was introduced to Britain is without parallel. Originally a Near Eastern folk practice, it was first regarded as an intellectual curiosity. It was not until the successful inoculation of Lady Mary Wortley Montagu's daughter, that the medical profession became interested in putting inoculation into practice. A handful of eminent physicians made further trials of the procedure, but it took all their efforts, and the patronage of the Royal family, to convince British practitioners to adopt the procedure. Even so, it was rarely performed in the 1720s; throughout the decade, only a few hundred British men and women were inoculated.

However, in many ways, inoculation was entirely consistent with eighteenth century British medicine. Following its introduction in 1721, the practice was rapidly and so thoroughly integrated into British forms of medical thought and practice that little remained of the Near Eastern original by 1729. Debates over the procedure were couched in the familiar language of smallpox and fevers. Well established theory was used to rationalise inoculation and to explain the addition of new forms of therapy to improve results. The practice too, was typical of British medicine; inoculation was split between physicians and surgeons, along traditional professional divisions - surgeons performing the actual operation, while physicians took responsibility for the treatment of inoculated smallpox and overseeing the patients' health before and after inoculation. Both groups used well

established techniques, mainly drawn from the treatment of natural smallpox.

Inoculation was introduced to Britain in response to a growing death toll from smallpox. The disease reached the British Isles some time in the fourth century, having spread out from its original focus in Africa and India in the Middle Ages. Although smallpox had its own patron saint - St. Nicaise, a fifth century Bishop of Rhiems who survived the disease only to be decapitated by invading Huns - to whom prayers for the recovery of victims were addressed, it was a childrens' disease, mild and rarely fatal.¹ However, early in the seventeenth century, its nature changed, possibly as the result of a genetic mutation of the virus. Smallpox incidence increased sharply. Europe was struck by its first smallpox pandemic in 1614. The frequency of epidemics rose during the century; Scotland experienced smallpox outbreaks in 1610, 1635, and a series of epidemics between 1670 and 1689.² Mortality rates also increased sharply, as the disease began to attack adults for the first time. Jean Claude Helvetius reported

Mankind for a long time thought there was little Danger in the Small-Pox. They were grown as it were familiar with them, by being accustomed to see the Recovery of most Children who had them...'Twas with some Amazement they beheld their fatal Effects upon Persons more advanc'd in Years.³

The seventeenth century epidemics were devastating; in 1671 in Glasgow, smallpox was reported to have killed eight hundred, so that "hardly a familie [sic] in all the city but was infected, and rare it was to find a family wherein some was not taken away by death."⁴

By the early years of the eighteenth century, smallpox was a major cause of death in Britain. Widespread mortality crises between 1717 and 1730 were largely caused by smallpox.⁵ In London, where smallpox deaths were recorded as a separate category in the bills of mortality from 1701, the disease was endemic and every few years, the number of deaths doubled or trebled as the disease became epidemic. In 1714, 1716 and 1717 well over two thousand Londoners died from smallpox and in 1710, and 1719 the disease claimed over three thousand victims, constituting almost thirteen percent of all deaths. On average, the percentage of deaths attributed to smallpox rose steadily throughout the eighteenth century, from around five percent in the early decades to over ten percent in the 1750s.⁶ (See Appendix I) Such rates were not confined to London - similar levels of mortality were reported from Edinburgh.(See Appendix II)

Smallpox engendered tremendous fear, which comes over clearly in eighteenth century writings. To the historian, Thomas Macaulay, smallpox was

always present, filling the churchyard with corpses, tormenting with constant fear all whom it had not yet stricken, leaving on those whose lives it spared the hideous traces of its power, turning the babe into a changeling at which the mother shuddered, and making the eyes and cheeks of the betrothed maiden objects of horror to the lover.⁷

Macaulay's poetic language hid a grim reality. Smallpox was a particularly unpleasant disease. Victims first developed feverish symptoms, and diagnosis was confirmed three or four days later when the characteristic spots or 'pocks' began to appear. The spots were red, but soon developed the characteristic pus-filled yellow head. They were extremely painful and burst with any movement of the patient, giving off a foul smell. They were thickest on the

face and hands, and in severe cases covered the surface of the skin so that the patient became almost unrecognisable. In mild cases, the symptoms subsided once the rash was complete, the pocks began to dry or "turn" about the fourteenth day and the patient recovered within a month. In more serious cases, patients developed a secondary fever, which was often fatal.⁸

Smallpox had a high mortality rate. In severe outbreaks it killed as many as one in five, and on average one in ten or one in twelve of those who caught the disease died from it. Most survivors were left badly disfigured, as the pocks destroyed the structure of the skin, producing permanent pits and scars. One poet vividly described smallpox as

Thou that of faces honey-combes dost make
And of two breasts two cullenders.⁹

Where the eruption affected the eyes, victims might be blinded. If the disease affected the nervous system, it left weak or useless limbs. Many victims suffered long periods of general ill-health or became permanent invalids.¹⁰

Smallpox was brought forcibly to the attention of all sections of the medical profession - to the elite as well as the rank and file. Unlike most epidemic diseases, smallpox attacked the rich as well as the poor. In fact, wealthy families were thought to suffer a higher smallpox mortality than poor, as a result of their luxurious lifestyle. Certainly the disease caused havoc among European royal families. The British monarchy was not exempt. Queen Mary and the Duke of Gloucester died of smallpox in the epidemics of the 1690s.¹¹

Although eighteenth century physicians are usually portrayed as ultra-conservative in their thought and practice, they were quick to respond to the

threat of smallpox. Of all the groups of practitioners, physicians have received the worst press; contemporary caricatures of pedantic incompetents, flaunting vast wigs and gold-headed canes, spouting learned Latin but more concerned with their fees than their patients, have stuck and been cited by unsympathetic historians. The conservative label has risen largely from the physicians' use of a medical theory based on the classical Greek conception of humours. All disease resulted from an disequilibrium of the body fluids. Symptoms - sweating, diarrhea, bleeding - were interpreted as the body's attempts to restore a more normal status. Therapy consisted mainly of assisting the natural response, or countering the imbalance by drugs which provoked evacuations.¹² However, this medical theory provided an immensely flexible as well as a powerful system to describe disease, which could accommodate new observations, interpretation of symptoms, and novel combinations of therapy.

The late seventeenth and early eighteenth century saw a flood of works on smallpox, particularly following the bad epidemics of the 1680s and 1710. Physicians disagreed as to the causes of smallpox although there was general consensus on the disease process. Morbid smallpox matter was formed in the blood, through some combination of the body fluids and infective matter or possibly a fermentation process. This was separated or 'concocted' from the blood during the fever, and travelled to the skin. There it formed the distinctive pocks.

Practitioners also proposed new methods of treatment. In the late seventeenth century, Richard Morton's 'hot method' was the most common form of treatment. Patients were confined to a room with large fires and kept

in bed under mounds of covering to make them sweat, thereby driving out the smallpox matter. In the 1660s, Thomas Sydenham began to question whether this method really worked. He found that more passive therapy, aimed at moderating the fever and putting the body in the best possible condition to go through the disease process was much more successful. Bloodletting, purges and emetics, cold drinks and exposure to fresh air were used to regulate the circulation and remove morbid matter.¹³ During the eighteenth century, practitioners carried on a lively debate over the exact form of treatment; in 1717, following a scurrilous pamphlet debate, John Woodward and Richard Mead even came to blows over the merits of their own particular systems of therapeutics.¹⁴

Physicians also became interested in methods of deliberately infecting patients with smallpox so as to induce a mild form of the disease. At least four separate accounts of inoculation had reached Britain by 1716. The least influential was that published by Peter Kennedy, a Scottish surgeon who had lived in Constantinople for some years, in his Treatise of External Diseases of 1715.¹⁵ Far more important were three accounts received by the Royal Society of London. Throughout the seventeenth and eighteenth centuries the Society, whose membership included many of London's elite practitioners, acted as a clearing house for reports of all things exotic or unusual.¹⁶ In 1700, Dr. Clopton Havers read a report of a Chinese method of infecting people with smallpox by inhaling powdered scabs from the pocks.¹⁷ In 1714, an account of inoculation in the Near East was presented by John Woodward. His description of the technique came from Emanuel Timoni, a Swiss physician attached to the British diplomatic mission in Constantinople.

According to Timoni, inoculation was practiced by a small number of Greek women. They collected the fluid contained in the mature pocks of a victim suffering from a mild case of smallpox. It was then kept warm until used. Patients were infected by rubbing it into a number of small scratches. Within a few days they developed febrile symptoms about a week later and thereafter the disease followed its usual course. The smallpox was usually very mild with only a few pocks and consequently little scarring.¹⁸

This report aroused so much interest that the Secretary was requested to write for further information. This arrived, two years later, from Jacob Pylarini, an itinerant physician who had practised throughout the Near East, in the form of a copy of his short pamphlet on inoculation which had originally been published in Venice in 1715. Like Timoni's description, this account was later printed in the Society's journal, the Philosophical Transactions.¹⁹

Although there was considerable interest in inoculation, it was regarded as a 'virtuoso-amusement' and a curiosity. No attempt was made to actually put it into practice until after Lady Mary Wortley Montagu had proved that it worked. Lady Mary, a formidable eighteenth century bluestocking also learned of inoculation from the East, while travelling with her husband, the British ambassador to Turkey. Lady Mary had good reason to be interested in a method calculated to ensure mild smallpox; her brother died of the disease, and she had been a noted beauty until she caught smallpox just after her marriage, which left her badly scarred.²⁰ In 1718, she stated her intention to have her children inoculated, and once established in Constantinople, she ordered Charles Maitland, a Scottish surgeon attached to

the diplomatic mission, to make inquiries about the procedure. Having satisfied herself as to its safety, Lady Mary called in a local woman to inoculate her six year old son. According to Maitland's own account,

The good woman went to work; but so awkwardly by the shaking of her Hand, and put the Child to so much Torture with her blunt and rusty Needle that I pitied his Cries,...and therefore Inoculated the other Arm with my own Instrument.²¹

The operation was a complete success - the child had very mild smallpox which left no scars.²²

Shortly after, the Montagu family returned to London. When a smallpox epidemic broke out in the spring of 1721, Lady Mary ordered Maitland to inoculate her younger daughter. There was some delay before the operation took place. Maitland later put it down to the cold, wet weather, but it was probably due to a dispute over whether any physician should attend the case. Following her bad experience with her own smallpox, Lady Mary nursed a strong dislike of the medical profession, and initially refused Maitland's request that a physician oversee the inoculation. By April some compromise had been reached, and Maitland finally inoculated the child. Three physicians were allowed to visit later to observe the effects of the procedure. They found the child suffering from very mild smallpox with the pocks clearly visible, but not at all indisposed.²³

Although Lady Mary was responsible for the first inoculation in Britain, her role in introducing the practice has been greatly exaggerated. The inoculation of her daughter did not immediately lead to the adoption of inoculation; few were aware of the episode, and only one followed her example. Dr. Keith, one of the physicians who saw Lady Mary's daughter after

inoculation, was so impressed he had Maitland inoculate his son Peter.²⁴ In later years, Lady Mary tried to encourage inoculation more widely - taking her daughter to friends homes as proof of its beneficial effects, but she subverted her own efforts by her opposition to the medical profession, and later took it upon herself to criticise their techniques.²⁵ In fact, writers did not recognise her contribution until mid century.²⁶

Credit for establishing inoculation in Britain should go to a group of eminent physicians, attached to the royal court and the Royal Society. Shortly after the Montagu inoculation, they began to conduct a series of experimental inoculations. Sir Hans Sloane, Secretary of the Royal Society and one of the court physicians, used his position to beg pardons for six condemned prisoners who would act as 'guinea pigs' for inoculation. Three men and three women, all inmates of Newgate gaol were selected, and on the 9th of August were inoculated by Charles Maitland under the supervision of Sloane and Sir John Steigerthal. When no symptoms appeared over the next three days, the operation was repeated, Maitland fearing that the matter had not been infectious. Almost immediately five of the prisoners began to sicken, and suffered mild attacks of smallpox. The operation had no effect on the sixth, who had previously had the disease. All six prisoners were duly pardoned and released. To test the degree of immunity conferred by inoculation, one of the female prisoners was sent to Hertford to nurse smallpox victims, under Maitland's supervision. Even though he ordered her to share a smallpox victim's bed she did not contract the disease.²⁷

Whereas the inoculations of the Montagu and Keith children were private affairs, this trial of inoculation was conducted in a blaze of publicity.

Around twenty five practitioners witnessed the operation, and medical men continued to inspect the prisoners daily. News of the experiment was spread over the country by newspapers.²⁸ Applebee's Original Weekly Journal, The Post-Boy and The Weekly Journal; or British Gazetteer published descriptions of inoculation, reports of the operations, and bulletins on the progress of the inoculees. The newspapers also published accounts of further experimental inoculations carried out on a group of six children and adults and on five orphans in February and March 1722.²⁹

The prestigious support of the Royal Society and the royal patronage, which extended to having two of the Prince of Wales' children successfully inoculated in April 1722, were crucial in encouraging practitioners to take up inoculation. Thomas Nettleton, a physician in Halifax, Yorkshire wrote "When we had the Account in the Publick Papers, that [inoculation] had by their Royal Highness's Command been done with success in *London*, I cou'd not be satisfied without trying it here."³⁰ Nettleton, like most practitioners learnt the technique from published descriptions. He later explained "all the information I had concerning [inoculation]...was entirely from the Philosophical Transactions".³¹ Inoculation spread to America in the same way; in Boston in 1721, shortly before the Newgate trials Zabdiel Boylston successfully inoculated over two hundred persons from Timoni's account of the procedure.³²

Although a small number of practitioners were quick to adopt the new procedure, there was also strong opposition to inoculation, and the Royal Society physicians were kept busy over the next few years, pressing the merits of inoculation. This debate reveals how such a new and unusual practice was

integrated into an established framework of medical thought and practice. Both opponents and supporters of the new practice interpreted the effect of inoculation in the familiar terms of smallpox and fevers.

Practitioners opposed to inoculation stressed the differences between natural and inoculated smallpox. The form of infection was different; in natural smallpox, the victim breathed in small, active air borne particles while the infective material used by inoculators was 'thick and purulent' containing only 'blunt' particles. Rather than passing through the lungs and stomach as in the natural disease, the inoculated matter entered the bloodstream directly. In this respect, it was more like the reabsorption of matter in natural smallpox, which caused the dangerous secondary fever in natural smallpox, or the Royal Society's failed transfusion experiments.³³

As a result, few inoculated patients developed 'true and genuine' smallpox - most suffered only a rash or pimples which bore no resemblance to that of the natural disease and, allegedly, left patients open to further attacks of smallpox.³⁴ According to one writer, the disease suffered by the Newgate prisoners was "nothing like the Small Pox, either in *Symptoms, Appearances, advancing the Pustules, or the Course of the Distemper*. And it would puzzle anyone to conceive how 'tis possible the Small Pox can ever be prevented by it."³⁵ Other writers gleefully recorded cases where patients caught smallpox after going through an apparently successful inoculation.³⁶

The critics of inoculation also contradicted themselves by arguing that the procedure did not guarantee a mild case of smallpox. Legard Sparham claimed that matter inserted into an incision acted as a continual supply of 'poison' feeding into the bloodstream, and produced severe smallpox.³⁷

Other opponents pointed out that the severity of smallpox depended on the state of the patient's blood and that as there was no way to assess or alter its condition, inoculation could not ensure mild smallpox, but was just as likely to induce severe smallpox as natural infection.³⁸

Inoculated smallpox was not only severe, it could prove fatal, and deaths following inoculation, such as those of the Earl of Sunderland's son and a servant of Lord Bathurst, were reported in detail. Francis Howgrave quoted the mother of the unfortunate Miss Rolt who "died worn to nothing but skin and bone. She had *six and thirty running sores*...when she died; and they were forc'd to roll up her *joynts in pastboard*,[sic] least the joynts should fall out of their places."³⁹ Opponents of inoculation believed that the British public were being duped by the new procedure. Sparham placed inoculation at the head of all the scandals of the age: "We have seen *South Sea Schemes*, good Parliaments, Bills for preventing the Plague; heard of Plots: but till now, never dreamt that Mankind would industriously plot to their own Ruin, and barter Health for Diseases."⁴⁰

Medical practitioners were not the only group to oppose inoculation; two churchmen published pamphlets claiming that inoculation conflicted with proper Christian behaviour. The Reverend Edmund Massey claimed that it was literally, a diabolical process, used by the Devil to smite Job with boils. More immediately, by deliberately infecting patients with a dangerous disease, inoculators tempted Providence, and interfered with the Divine ability to send disease and death as a punishment for sin.⁴¹

The pro-inoculation lobby sought to reassure the public that inoculation was not the strange and unnatural form of medical practice

suggested by its opponents. If, as the anti-inoculators claimed, the procedure did not produce smallpox, and did not ensure immunity, then why had it flourished for so long in the East? Supporters also managed to find folk inoculation practices in Britain, which involved holding or rubbing infective matter on the skin.⁴² Although infecting patients with a disease was unusual, it was not without precedent. Practitioners deliberately induced fits of the gout to draw morbid matter down to the foot and away from the centre of the body where it might prove fatal. Inoculation was no different from common practices such as vomiting or bleeding, which sought to preempt the effects of fevers. They also tried to present inoculation as a positive practice. Inoculation did not deliberately make someone ill, it was a process of 'cleansing' the blood of the smallpox fuel.⁴³

They dismissed claims that inoculation did not produce smallpox - inoculated patients were infected with the same matter, suffered the same pattern of symptoms, and, unfortunately, were equally capable of passing on smallpox as those infected naturally.⁴⁴ The only difference between natural and inoculated smallpox was that the latter was consistently milder and produced fewer pocks. This, the inoculators explained, was a consequence of the procedure and being able to choose the most favourable circumstances for the disease. Practitioners used a small quantity of infective matter which had a minimal effect on the blood, producing only small amounts of morbid matter. Some of this matter was discharged through the incisions which suppurred throughout the disease episode.⁴⁵ Inoculators could practice only at a favourable season of the year and choose patients who were healthy and of a favourable age and constitution. Knowing they were about to contract

smallpox, patients could live quietly, following a diet calculated to put their bodies in the best possible condition to cope with the infection, and avoid any over excitement or heavy drinking which might inflame the blood and produce a severe case.⁴⁶

However, even in such favourable circumstances, the pro-inoculation camp had to admit that the procedure was occasionally fatal, although deaths were far less common than the opponents of the procedure suggested. Such occasional failures were no reason to reject inoculation; compared to natural smallpox, inoculation caused far fewer deaths. To prove the safety and efficacy of inoculation, James Jurin, Secretary to the Royal Society, and later his protege John Gaspar Scheuchzer collected accounts of all inoculations performed in Britain, and investigated all reported deaths. They attributed many to complicating factors - such as a tendency to convulsions, or the patient's drinking before the operation. Even so, they calculated that on average, around one in fifty patients died as a result of inoculation, whereas nearly one in twelve of those catching natural smallpox died of the disease.⁴⁷

Just as the debates over inoculation were couched in the familiar terminology of smallpox and fevers, inoculation techniques, too, were drawn from well established forms of practice and as a result, was transformed almost out of all recognition. In Constantinople, inoculation was performed by lay practitioners. In Britain, the procedure was split between groups of practitioners according to traditional divisions of practice, and according to the skills and training of the different types of practitioners. These divisions dated back to medieval times. The physicians were the intellectual leaders of the profession. They tended to be drawn from, or later assimilated themselves

to, the upper ranks of society and belonged to the professional classes, on a par with churchmen. They were distinguished by the possession of a university degree, and their skills were entirely based on theory and clinical expertise. They held a monopoly on internal medicine; using their knowledge of the body and of humoral theory they diagnosed diseases, predicted their likely course and outcome, and prescribed diet and medicines.

All manual aspects of practice were left to the lower branches of the medical profession. The surgeons and apothecaries developed from the guilds of barber-surgeons and grocers, and retained their traditional form of training by apprenticeship. Both groups worked under the supervision of the physicians; the apothecaries made up prescriptions, and the surgeons applied therapy - enemas, bleeding, blisters and so forth. The two groups also worked independently of the physicians. Apothecaries compounded and sold drugs, while the surgeons practiced on the exterior of the body, treating wounds, tumours, ulcers, skin diseases and venereal disease.⁴⁸

Inoculation straddled these divisions of practice. The actual infection of patients required making an incision and so fell within the province of the surgeons, while the treatment of inoculated patients and responsibility for their health throughout the procedure was clearly part of the physicians' duties. Physicians also had overall charge of the proceedings and supervised the surgeon's actions.⁴⁹

Although the divisions were frequently ignored for other forms of care, they were very strictly observed for inoculation. The Royal Society's records of almost nine hundred inoculations show that both a physician and surgeon were normally employed. In London the surgeons John Ranby and

William Cheselden inoculated patients under the care of Sir C. Sprengell and Dr. Henry Plumptre respectively, while Charles Maitland continued his partnership with Hans Sloane.⁵⁰ Surgeons often worked with a number of physicians - Claude Amyand, one of the royal surgeons was recorded cooperating with eleven different physicians, including such eminent figures as Richard Mead, John Steigenthal, James Jurin, Hans Sloane, and John Arbuthnot.⁵¹ The divisions were just as scrupulously observed in the provinces. In Norwich, Mr. Johnson, an apothecary, inoculated patients under the care of Dr. Bohum and Sir Benjamin Wrench; John Millard, a surgeon in Havant, Hampshire, inoculated patients attended by Dr. Edward Bayly.⁵² In Dublin, Hannibal Hall inoculated with three different physicians, and developed a partnership with a Dr. Mitchell.⁵³ Even when practitioners inoculated their own children, they employed a physician. An apothecary called Johnson inoculated his own daughter but called in Sir Benjamin Wrench to oversee the proceedings.⁵⁴ The Society records list only one instance where a surgeon - Mr. Baker of London - inoculated and cared for patients "by himself", although he was also recorded working with James Jurin.⁵⁵

The use of two practitioners was all the more unusual given that most of those inoculated were children, whose minor childhood complaints were usually dealt with by surgeons or apothecaries.⁵⁶ There were probably two reasons for the careful observation of the old divisions of practice. First, the nature of inoculation itself; it was a new, relatively unknown and potentially dangerous form of medical practice, and patients probably felt it was best to have the best possible medical care standing by, should the procedure produce

severe smallpox. Patients felt able to dispense with the physician's services only in exceptional circumstances. Sir John Rogers' children were attended by two surgeons, one performing the operation, the other taking over the physicians' role and caring for them after inoculation because they were "in no danger".⁵⁷ Second, most of the early supporters of inoculation were drawn from the ranks of the elite physicians, who were the group mostly likely to retain the traditional hierarchical professional divisions.

Both physicians and surgeons transformed inoculation practice. Although inoculation was initially copied from a Near Eastern folk practice, they made little attempt to replicate the techniques used; instead they applied their own well established forms of practice and greatly elaborated the procedure. In the East, the encounter between inoculator and patient was brief. The inoculator arrived bringing infective matter, collected from a mild case of smallpox. Using a needle to prick or scratch the skin, she made a number of incisions. Lady Mary reported that the inoculators made scratches

in the middle of the forehead, one in each arm, and one on the breast, to mark the sign of the cross; but this has a very ill effect, all these wounds leaving little scars, and is not done by those that are not superstitious.⁵⁸

Others made as many as eight incisions, on the feet, wrists, cheeks, chin, and the hairline. The infective matter was mixed with the blood which issued from the wound, then the inoculator bound a walnut shell over the inoculation site to prevent the infective matter being rubbed off and left.⁵⁹

Instead of making scratches with a needle, British surgeons made incisions using a lancet similar to those for 'issues' - a small wound which was deliberately kept open to allow humours to escape. They consisted of a

transverse cut about half an inch in length, deep enough to penetrate the superficial layers of the skin made over the muscular area of the upper arm or leg.⁶⁰ They also stopped using liquid matter; it was difficult to collect sufficient fluid using the Eastern method of pressing out drops of fluid from the pocks. Instead, British practitioners opened a pustule, and absorbed the matter on small pieces of lint or thread. The lint was then bound over the incision for a few hours. If it was not immediately required, the matter could be preserved for days or weeks by drying the impregnated thread.⁶¹

Unlike the eastern inoculators, the surgeons' role did not end once they had performed the inoculation. During the smallpox episode, the incisions suppurred, - as practitioners believed - discharging some of the morbid smallpox matter which normally caused the fever and pocks. To ensure patients suffered very mild smallpox with little or no symptoms, British inoculators encouraged this suppuration. During the 1720s, they cut larger and deeper incisions and replaced simple dressings with irritating "digestive" dressings which were changed once or twice a day for at least a week.⁶² Alternatively they converted one of the incisions into an issue by inserting a pea or some other piece of inert material, which kept the wound open for several weeks, or cut additional issues at the same time as they performed the inoculation.⁶³

Using these techniques, surgeons believed that virtually all the smallpox matter could be discharged through the incisions, leaving patients immune to further attacks even though they had none of the characteristic symptoms of fever or eruption.⁶⁴ Charles Maitland described one case in which "No eruptions appeared, but the Incisions run tho' not so long as

usual to be a security from the Small Pox", and another in which "the Incisions run [sic] plentifully Sufficient to secure him from the Distemper."⁶⁵

There was no precedent for the physicians's role in the Eastern practice, although since physicians cared for cases of natural smallpox, it was perhaps natural that they should also attend patients suffering from inoculated smallpox. However, if the inoculation had been successful in producing very mild smallpox, the physician was left with "little or nothing to doe [sic]".⁶⁶ Instead, the physicians developed an entirely new role overseeing the 'preparation' of the patient for inoculation. This aroused the disgust of Lady Mary Wortley Montagu. Writing in the Flying Post, or Post-Master under the pseudonym of 'A Turkey Merchant', she accused practitioners of needlessly elaborating inoculation in order to line their own pockets.⁶⁷ The physicians, however, insisted that it was an essential means of improving the success rate of inoculation by ensuring patients were in the best possible state to receive the infection.

The techniques used in preparation derived from the physicians' traditional skills in manipulating the body fluids to cure disease and to maintain health through diet and medicines. In only the second inoculation in Britain - that of Peter Keith - his father ordered that the boy should be bled before the operation, since he was of a sanguine disposition, and was therefore likely to suffer a high fever and severe smallpox.⁶⁸ The use of a more elaborate regimen was suggested by Charles Maitland. In 1722, he inoculated two brothers and was surprised that the younger had a very mild case, while the elder suffered severe smallpox. Maitland attributed the latter's bad case to his gross constitution and diet of coarse foods. He therefore

proposed that inoculators should "cleanse foul habits" before the operation, and keep patients to a strict regimen throughout the procedure.⁶⁹

Some form of preparation quickly became a routine part of inoculation. In part, preparation tried to reproduce the Eastern conditions under which inoculation was reportedly so successful. Patients were advised to remain in "a warm Room", this being the nearest equivalent to a Mediterranean climate normally found in Britain.⁷⁰ As in the East, British physicians recommended their patients abstain from eating meat and spiced food or drinking wine or spirits before and after inoculation.⁷¹

This advice dovetailed neatly with the popular 'cold regimen' used to treat smallpox and all manner of diseases.⁷² Diet was an important part of the treatment; patients were forbidden to eat meat or acid, salty, sharp or highly spiced foods or to drink spirits, which might raise the fever. Instead they kept to a bland 'low' diet of gruels, vegetables, fruits and broths.⁷³

These therapies were transferred wholesale into preparation, to preempt the fever, and to regulate the circulation and the condition of the blood so that it was unable to support a high fever. Patients were prescribed a course of bleeding and evacuant medicines to remove any foul matter from the stomach and intestines to restore an equilibrium of the body fluids.⁷⁴ They followed the same strict diet as fever patients, eating only bland foods; bread and butter, tea, milk, porridge or gruel, baked apples and light broths for a month or more before inoculation.⁷⁵

Just as there was no one method of treating all smallpox cases, there was no set technique for preparing patients. Every case of smallpox was unique, influenced by a complex range of factors - the patient's age, sex,

constitution, lifestyle, the season, the prevailing qualities of the air and so forth - so each required slightly different therapy. If the patient was strong and robust and of a sanguine constitution, or if the fever was high, then the cool method should be used, but for weak patients suffering from low, nervous fevers, then a warmer regimen with stimulating medicines had to be applied.⁷⁶ In preparing patients for inoculation, too, the physician had to strike a balance: too little preparation, and the patient was left exposed to the danger of severe smallpox; if too severe a regimen was used "the Eruption did not proceed so well" and physicians had to stimulate the fever with cordial medicines.⁷⁷ The regimen was adjusted to take account of age, constitution, and lifestyle. Children, who normally used a low diet and recovered well from natural smallpox, were often inoculated with little or no preparation, although not all escaped the rituals of bleeding, purging and a restricted diet.⁷⁸ The patient's constitution was a primary consideration. Dr. Bohum ordered four "gross, corpulent children" to be bled and purged before inoculation, and Dr. Mitchell had a "sanguine and fleshy" child kept to a "thin diet" for three weeks before he attempted the operation.⁷⁹ Adults were usually prescribed a more rigorous preparation, particularly those of a sanguine constitution. A young woman of "full habit" was bled, purged, and placed on a strict diet by Claude Amyand.⁸⁰ The patient's lifestyle also affected the degree of preparation required. Those who indulged in "violent Exercise, luxurious Living, [or] Drinking to Excess" required careful preparation since all these activities left the blood in a state where inoculation was likely to produce a high fever.⁸¹

In the 1720s there were no clear cut methods of preparation. Individual practitioners favoured different combinations of regimen and medicines. Most required their patients to change their diet in some way. Thomas Nettleton allowed his patients to "eat and drink as usual, tho' something more sparingly, till the Fever begins to rise": only then were they required to follow a strict, low diet.⁸² Other practitioner preferred to use medicines. W. Offley's patients were bled and vomited, but only had to abstain from eating meat, while George Lake bled and purged all his patients, but did not require them to change their diet.⁸³

Patients exerted some control over the choice of therapy. Physicians sought to please their wealthy clients and negotiated rather than dictated the form of preparation.⁸⁴ One patient who was "adverse to bloodletting" was prepared using rigorous purges. A number of inoculees "prepared themselves" by following a "low" diet, although their efforts did not always meet with the approval of their physicians; Dr Curteis complained that one of his patients had used too low a diet, and consequently required stimulating treatment during the smallpox episode.⁸⁵

Despite this successful integration which quickly brought inoculation into line with familiar forms of practice, and the distinguished patronage of the court and the Royal Society physicians, inoculation did not become popular in the 1720s. By 1729, fully eight years after the introduction of inoculation, less than nine hundred people were recorded as having undergone the operation. Few medical men took up the practice; only five practitioners began inoculating in 1721 and 1722 and only seventy practitioners were recorded performing inoculation during the 1720s. As a

result, the operation was unavailable in large areas of the country. There were no inoculators in Scotland, only one in Wales and two inoculators in Ireland. Inevitably, inoculators clustered in large towns. In Norfolk, all four inoculators practiced in and around the county town of Norwich. Although Hampshire was unusually well supplied with inoculators they all worked in urban centres; Portsmouth, Winchester, Southampton, Gosport, and Havant.

Patients determined to be inoculated and unable to find a local inoculator called in practitioners from other counties. Thomas Nettleton inoculated patients in Yorkshire, Northumberland and Derbyshire, and Dr. Frewin journeyed from Oxford to Wooton in Buckinghamshire specifically to care for four inoculees.⁸⁶ Patients also travelled considerable distances to put themselves under the care of a reputable inoculator; a Mr. Woods went forty miles to be inoculated by Edward Bayly, and a Miss Conduitt of Hambolton was brought to Portsmouth to be inoculated by Samuel Brady.⁸⁷

The use of inoculation was also restricted by its high cost. There are few records of the charges made for inoculation. One pamphleteer, Richard Franklin offered to undertake inoculation for one guinea, but it is not clear if this covered only the operation, or included medicines and attendance.⁸⁸ If Lady Mary Wortley Montagu's claim that physicians received two guineas a day to treat patients with natural smallpox is to be believed, then the expense of retaining two practitioners for the month or so required for inoculation must have been prohibitive.

The majority of those inoculated were children and servants of the gentry. This group were thought to suffer particularly badly from smallpox,

and Charles Maitland directed his Account of Inoculating at them, warning that for their daughters, the disfiguring effects of severe smallpox could ruin their chances of an advantageous marriage, while the death of sons meant that "great Families were extinguished...and their Titles and Estates thereby transmitted to Strangers".⁸⁹ Certainly, the Royal Society's records include a cross section of the peerage. Among the patients inoculated by Charles Maitland and Claude Amyand were a prince and two princesses, the Earl of Holderness, the Marquises of Granby and Middlesex, the Duke of Rutland, and the families of assorted knights, baronets and foreign diplomats.⁹⁰ In the provinces, a few tradesmen and professional men, also had their families inoculated. The children of 'gentlemen', farmers, divines and lawyers, a writing master, a chandler, a silk stocking weaver and several army officers appeared on the Royal Society's lists.⁹¹

Because of the risks of death or disfigurement associated with inoculation, it was most popular during epidemics when there was a real risk of contracting smallpox. One servant, John Fosdike, a gardener, was 'frightened' into undergoing inoculation by the death of a fellow servant.⁹² Bad epidemics boosted the popularity of the procedure. Edward Naish explained that "The practice of Inoculating the Small Pox has lately prevailed at York, Chiefly for it's fatall Effects in the naturall way".⁹³ In London the number of inoculations more than trebled from forty six in 1724 to one hundred and fifty two during the 1725 epidemic.⁹⁴

Those particularly at risk - in families with a history of deaths from smallpox were most eager to adopt the practice. One practitioner explained that "The Occasion for the Parents complying with this extraordinary means

to preserve their Son was chiefly owing to the loss they had of his Brother who just before fell a Victim to the Distemper".⁹⁵ Nettleton recorded that he inoculated a girl "in a family where they had formerly Bury'd three Children successively of the Small Pox".⁹⁶ Sir C. Sprengell wrote of one case that "Both Father and Mother have suffered very much in the Small Pox which made them the more willing to save the Girl's Beauty".⁹⁷

Nevertheless, even eight years after its introduction, inoculation was still unusual, performed by a small minority of practitioners and used by few of Britain's population. Although unique as the only form of preventative medicine used in the eighteenth century, inoculation was also made consistent with British medical thought and practice. Inoculation was divided according to established professional divisions; physicians and surgeons took on those elements of the procedure which fell within their traditional sphere of practice. They interpreted the new practice in terms of established smallpox theory, and used that theory to justify the application of their traditional skills and techniques borrowed from the treatment of smallpox. Thus surgeons performed the actual inoculation, but radically altered the technique so as to remove morbid matter as well as infect the patient, believing this would help to ensure mild smallpox. Similarly, the physicians greatly elaborated the notion of preparing patients to undergo the disease, applying therapy used to treat fevers in an effort to preempt a fever. They also maintained the individualistic approach to disease, prescribing a regimen adapted to the circumstances of each patient. In spite of its foreign origins and unfamiliar *raison d'être*, inoculation was integrated into the fabric of British medicine

and made to reinforce the structure of the medical hierarchy and confirm prevailing forms of knowledge and practice.

Footnotes to Chapter One

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Chapter Two: A Medical Reformation: Smallpox Texts 1680-1730

By 1729, inoculation, though hardly popular, had become established and integrated into standard forms of medical thought and practice. However, the techniques developed in the first nine years of the practice did not last. From 1750 until 1770, inoculation went through a period of prolonged change, in which the highly individualised preparation gave way to standardised methods of practice, in which all patients received the same medicines and followed the same diet. These changes were not unique to inoculation practice, but were part of a broader change in medicine, which are well illustrated by a study of texts on smallpox published between 1690 and 1730.

Historians have tended to assume that the early eighteenth century was a conservative period, and that major reform of the medical profession, and medical practice came only in the second half of the century, through new institutions. However, as smallpox texts show, this 'revolution' was the culmination of a series of changes which began much earlier. Medical men were not as ultra-conservative as they have been made to appear in many histories of medicine; while retaining established patterns of thought and practice, physicians and surgeons were nonetheless willing to embrace inoculation, while modifying the Eastern treatment in an attempt to improve its success rate. This urge to expand medical knowledge and develop treatment was not confined to inoculation. In the first decades of the eighteenth century there was a general rejection of traditional classical theorising in favour of more clinically-oriented knowledge.

This urge to reform and improve medical practice is clearly visible in smallpox texts published between 1690 and 1730. Physicians developed a completely different approach to therapy. Early texts, which claimed that the form of smallpox, and its response to therapy changed from year to year. Consequently, the instructions on treating the disease were necessarily vague. In the 1720s, however, physicians began to describe smallpox as a specific disease, and define the disease process which was common to all patients. This provided the epistemological foundation on which to build routine methods of practice; texts described precisely how and when to apply a set array of drugs in a particular sequence.

Such changes in medical knowledge had far reaching implications for the structure of the medical profession. The physicians' status at the head of the profession was inseparably linked to their theoretical knowledge which was the key to understanding the multiple factors which influenced each case - the patient's constitution, his environment, the prevailing patterns of diseases, the climate and so on - and allowed them to prescribe the appropriate course of therapy. By introducing set routines of treatment, physicians appeared to neglect some of their distinctive skills. However, they stressed instead the need to make fine changes in these programmes of therapy according to the patient's constitution.

The early eighteenth century is usually portrayed as a period of conservatism. After the optimistic attempts to apply the scientific advances of the seventeenth century scientific revolution to medicine failed to yield practical improvements, physicians returned to classical theories. This intellectual torpor lasted until the so-called 'medical revolution' in the

second half of the eighteenth century. In the clinical setting of hospitals and dispensaries, a new generation of physicians and surgeons were able to examine large numbers of cases and correlate symptoms in life with pathological changes found at autopsy and created a 'new medicine'. Theories of disease based on the malfunction of organs and tissues replaced the age-old humoural idea of disease caused by qualitative change in the body fluids. This in turn made possible the advent of mass practice. All diseases produced the same pathological phenomena in all bodies, and thus all patients could be cured using the same treatments.¹

However, a close examination of medical texts suggests that the 'revolution' of the late eighteenth century was firmly rooted in developments in medical practice in the 1720s and 1730s. The urge to reform and advance medical knowledge was already well established in the late seventeenth and early eighteenth century. Sects of practitioners pressed the claims of their chosen science as a means of perfecting medicine. Iatromechanists, iatromathematicians and iatrochemists, while advocating different approaches to the problem, shared a belief that medicine should break away from complex theorising about qualitative changes in the body fluids, and seek to become more objective.²

Although these sects died out in the early eighteenth century, their belief in the relevance of scientific knowledge as a means to improve medicine did not. In 1723, Richard Blackmore voiced a general dissatisfaction with the classical writings which had been the backbone of medical knowledge up to the seventeenth century. Modern works were far superior in their understanding of disease and therapy. Blackmore and many other

writers advocated that physicians should not rely on classical learning, but should have a grasp of the sciences of chemistry, geometry, and mechanics, which were basic to the understanding of the body's function in health and disease, as well as the more traditional knowledge of physiology, pathology and materia medica.³ To some extent, this move away from classical knowledge to new science was put into practice at the medical schools at Leyden and particularly at Edinburgh. There, students progressed systematically through the curriculum from the sciences - anatomy, chemistry and botany - to strictly medical subjects - physiology, pathology and materia medica. They were taught not the classical writings, but theories developed by their distinguished teachers.

A second theme of this call for reform was a concern that physicians should seek to combine experience with reason. Dry book-learning was not enough for good practice and formal theorising should grow out of observation.⁴ This was the new badge of the true physician. William Hillary, a product of the Leyden school, proclaimed; "A knowledge of the functioning of the body, the causes of diseases and the action of drugs had to be linked to "accurate Observations in Practice, that we must improve our Knowledge in the State of Physic and Diseases: it is this Knowledge, and These Abilities, that must be the distinguishing *Characteristic* of a true *Physician* from an *Empiric*."⁵

This vogue for observation took a number of forms. It was most visible in the creation of opportunities for clinical training. In Leyden, Hermann Boerhaave gave clinical lectures at the St. Caecilia Hospital.⁶ At Edinburgh, clinical courses were instituted in 1748. Students heard lectures

on the cases of patients in the special clinical ward at the Royal Infirmary, and were able to observe patients, copy case notes, and follow physicians and surgeons on their rounds of the wards.⁷ Similar facilities were made available in the new hospitals and dispensaries which sprang up over Britain in the second half of the century.⁸ It also led to a new genre of medical writing: disease statistics. Practitioners published records of disease incidence, and often attempted to correlate them with environmental variables, usually the weather.⁹

Smallpox texts published in the first three decades of the eighteenth century show that this reforming impulse led to new theories of contagion, and, ironically, to the style of medical thought that Foucault has dubbed 'classical medicine'. In the case of smallpox, practitioners rejected the idea that cases varied according to the source of infection, and instead, suggested that smallpox was a specific disease, which produced the same symptoms in all patients.

Late seventeenth century and very early eighteenth century texts described as many as eight causes of smallpox. Practitioners recognised that smallpox was contagious and was spread either by the matter from the pocks or by inhaling the vapour or "miasma" given off by smallpox victims. They believed that it was also spread through the atmosphere; smallpox epidemics arose from a peculiar 'constitution' of the air. The exact nature of this disposition was unclear. Gideon Harvey, in his New Discourse of the Small-Pox and Malignant Fevers blamed a 'salin and scorbutick' quality of the air, which induced a similar disposition in the blood. Such a quality was unique to the northern hemisphere, and explained why smallpox was unknown in

southern regions.¹⁰ Any disruption of a healthy humoural equilibrium could also produce smallpox; among those listed by Edward Strother were "all Diet which is sharp, and apt to putrefy...Late Hours...Immoderate Exercise...Hard Drinking... Passions of the Mind, so they be vehement...natural Evacuations suppress'd".¹¹ As a result of this complex of factors, particularly the disposition of the air, the type and severity of smallpox varied markedly from year to year.

In the 1720s, writers stopped speculating as to the causes of smallpox, and abandoned their belief that smallpox changed over time. Instead they concentrated on describing the disease process and symptoms, in a manner which corresponds to Michel Foucault's description of 'classical medicine'. Later texts presented an idealised picture of a disease, traced through a temporal sequence of symptoms which were believed to reflect qualitative changes in the body fluids.¹²

In keeping with the vogue for observation, most texts opened with a history of smallpox, when it had first appeared, the early Arabic writings on the disease and how it had travelled to Europe. In spite of an often expressed rejection of speculation and theorising, most writers then provided a detailed - and highly speculative - account of the disease process. One of the first, and most detailed was that of Jean Claude Helvetius. His Essay on the Animal Economy, which was originally published in French in 1722 and appeared in an English translation in 1723, described how the air or some disruption to the body fluids activated a humour or ferment present in the body from birth. This ferment became mixed with the lymph, and was carried to the stomach where it combined with the chyle. Some of the

resulting 'morbid matter' was excreted, the remainder travelled into the blood causing a fever, which separated the remaining morbid matter. It joined with the 'perspirable humours', blocking the glands of the skin and causing the pimples. The matter which filled the pocks was composed of smallpox humour and extravasated blood.¹³

British writers also began to emphasise the disease process, but they connected it with iatromechanical theories of contagion developed in the early 1720s. Although Genevieve Miller attributes these new theories to the experience of inoculation, very few writers made any reference to the procedure. They seem to have developed from iatromechanical theories of poisons and a concern over the possibility of an epidemic of plague.¹⁴ All 'pestilential fevers' - plague, smallpox, and measles - were transmitted by 'poisons'. These were not poisons in the modern sense of the word, but simply any substance which, when introduced into the body, caused severe pathological disturbance. In the case of smallpox, the poison or 'virus' consisted of minute particles given off in the victim's miasma. These became infectious when mixed with the air.¹⁵

Once in the body, the smallpox poison produced a particular set of symptoms, although there was no consensus on exactly how it did this. According to Richard Mead, the smallpox 'poison' contaminated the blood and affected the nerves and animal spirits, triggering the body's natural response to expel the foreign matter.¹⁶ Clifton Wintringham offered a purely mechanical explanation. He suggested that the infecting matter joined with particles in the blood to form large molecules. These were carried along by the circulating blood until they reached the fine capillaries in the skin, where

they became trapped. The obstruction produced inflammation, which became a pock. Victims became immune to further attacks of smallpox because the capillaries were left permanently distended, so any further smallpox matter passed harmlessly out of the body.¹⁷ Thomas Fuller, writing in 1730, developed an elaborate scheme in which the infectious particles impregnated 'ovula' within the body, which then produced the morbid smallpox matter.¹⁸

The works of Helvetius and of the iatromechanists had important implications for the treatment of smallpox. Seventeenth-century writers believed that the severity of smallpox, and its response to therapy was determined by the 'epidemic constitution' of the air and changed from year to year - hence why Thomas Sydenham published a number of accounts of the appearance of the disease in different years. The best form of treatment therefore varied widely; in some years, purging might prove beneficial, in other vomiting or bleeding might be the only means of cure. Consequently, texts on smallpox gave only a rough guide to the best means of treating the disease, leaving the physicians to decide which were the best suited to the particular case. Their advice was bewilderingly contradictory. No writer was prepared to recommend either the hot or the cool regimen: each was appropriate in particular circumstances. If the fever rose too high, then Sydenham's method using cool air, cold drinks and evacuations would revive the patient and support the natural disease process, but if the fever fell, then the hot cordial medicines recommended by Morton would restore the disease process. However, both methods were dangerous if taken too far.¹⁹ Gideon Harvey described Sydenham's cool method as the "new killing

method" but also complained that most practitioners used too many hot cordials, which could also prove dangerous.²⁰

The use of particular therapies was equally fraught with danger. All treatment which removed smallpox matter or helped the natural disease process by which the morbid matter was concocted and expelled was beneficial, but only if applied at the correct time. Evacuations - bleeding, purges and vomits - were good if applied before the rash appeared. At later stages, they disrupted and hindered the expulsion of the morbid matter and could even prove fatal.²¹ Harvey warned "a Physician had better with a Beadle, knock his Patient on the head than bleed him after the eruption, for the other is the quicker Remedy."²² Similarly, opiates, used to calm the animal spirits and ensure sleep, were, according to Edward Strother, "medicines which either carry certain Life along with 'em, or Death in *Ambuscade*."²³ This mixture of recommendations and dire warnings was repeated through the whole catalogue of treatments.²⁴

The only detailed directions as to the actual treatment of smallpox were to be found in the prescriptions of famous doctors written for particular patients. These were occasionally published as models of good practice. Archibald Pitcairne's influential 'Advice on smallpox' was originally written for the 'Honourable Family of March', but was included in his posthumously published Whole Works. The instructions were much more precise than those found in general discussions of smallpox treatment. Pitcairne directed that his patient should be bled up to three times, even if the pocks were appearing. He gave prescriptions for various medicines. When the fever fell, the patient was given a decoction of sheeps dung mixed

with syrup of red poppies to help the pocks fill. Later, a mixture of syrup of white poppies in barley water was given to make the patient sweat. At the end of the disease, spirit of hartshorn, and syrup of violets was prescribed. Throughout the illness, the patient's diet should consist of bread, broths, sugar biscuit and milk, with prunes and whey if they became constipated. Pitcairne also described how to deal with particular symptoms; if the pocks disappeared, for example, blisters, bleeding, and cordials were indicated.²⁵

By the 1720s, however, this kind of detailed guide to treatment became more commonplace, as a result of the new smallpox theories. Whether or not smallpox was caused by a poison produced by other victims or by matter in blood, it induced exactly the same symptoms in the recipient. Smallpox contagion could not induce any other similar fevers; "the pestilence can never breed the Small-Pox, nor the Small-Pox the Measles" Fuller declared; "any more than a Hen can a Duck, a Wolf a Sheep, or a thistle figs."²⁶ The symptoms which accompanied the disease process were crucial in ensuring that patients became immune to further attack. John Shebbere wrote:

These symptoms...are such as are necessary for its being well gone thro': and therefore all these are as requisite to the producing of a favourable delivery from the small-pox, as a certain degree of heat is to the producing a pineapple, without which, neither the disease or the fruit can truly be brought to perfection.²⁷

At this time, writers finally began to reject Herman Boerhaave's suggestion that mercury and antimony might act as an 'antidote' to the smallpox poison, destroying or altering the infecting agent before it produced any smallpox matter, so that patients were cured without having any fever or eruption.²⁸

Since all cases of smallpox were fundamentally the same, later writers were able to construct plans of treatment based on the underlying disease process. They gave much more detailed instructions for smallpox treatment. Writers grouped smallpox cases according to the form of the disease, and set out appropriate methods of treatment for each.

From the seventeenth century, practitioners had identified different types of smallpox on the basis of the appearance of the rash. In distinct smallpox, the pocks were scattered over the body, while in confluent smallpox they were so numerous that they ran together. In the fatal "flox" pox blood appeared in the spots. Although these forms might appear very different, they were thought to be more or less severe forms of the same disease.²⁹

In the 1720s, writers began to correlate the different types of smallpox with variations in the disease process. In his Treatise of 1723, Richard Blackmore argued that in distinct smallpox, only the circulation was disturbed, but in the more severe confluent forms the structure of the blood broke down and it began to putrefy.³⁰ The two forms therefore required distinctive methods of treatment. In distinct smallpox, the physician should attempt to remove the morbid matter and restore normal circulation by first bleeding then purging and vomiting - and Blackmore recommended the amount of blood which should be drawn and the composition of the vomits.³¹ Thereafter, it was simply a matter of aiding the natural disease process by controlling the fever; if it rose too high, then a cool regimen was indicated, if it fell, then cordials should be used.³² Cases of confluent smallpox required a similar, but more rigorous programme of bleeding and

vomits, which should be given twelve hours later to have maximum effect. In addition, astringent medicines should be prescribed as soon as there were any signs of putrefaction, and temperate cordials given to encourage the eruption. During maturation, vomits, cordials and diluting medicines helped to remove smallpox matter.³³

Although all writers agreed on the nature of smallpox, they disagreed over the number and identity of the different types of smallpox. Richard Mead published his Treatise on Smallpox in 1747, although it was written sometime in the 1720s. Unlike Blackmore, he distinguished four types of smallpox - one simple and three malignant - according to the matter contained in the pocks. In cases of simple smallpox the matter in the pocks matured and the pocks dried and scaled off. They required only bleeding, vomiting, and purging and an appropriate regimen to control the fever. In malignant cases, however, the blood became vitiated, so that the body was unable to throw off the morbid matter and the pocks filled with peculiar fluids which never matured. Practitioners had to supplement the usual evacuants with medicines to expel the morbid matter, either by promoting the suppuration of the pocks or by evacuating the fluid by another route. The different types of smallpox required distinctive forms of therapy. In crystalline smallpox, in which the pocks filled with a clear liquid, that fluid could be evacuated by means of diuretics, especially nitre, combined with mild cordials. In the 'warted' form, the physician should attempt to thin the thick fluid which appeared in the pocks by sweating and blistering his patient. Bloody smallpox was treated using 'styptic' medicines - alum, vitriol, and bark - to coagulate the blood and prevent it passing into the skin.³⁴

A similar, but more complex division of smallpox was proposed by Jean Claude Helvetius. In his Essay on the Animal Economy, he distinguished no less than seven forms of smallpox. In addition to the four types described by Mead, Helvetius added "malignant-distinct" and "malignant-confluent" smallpox, both of which were characterised by a high inflammatory fever. He recommended that they be combated with absorbent drugs - containing coral, crab's eyes and pearl - which absorbed the juices from the corrupted chyle before they reached the blood and produced more smallpox matter. He also identified simple-confluent smallpox, which required diluting therapies.³⁵

This trend towards producing more detailed descriptions of smallpox therapy continued in the 1730s. But instead of suggesting methods of treatment for the different types of smallpox, later writers divided it into different stages of the disease process and set out a programme of therapy for each. They still recognised different forms of the disease, but returned to the idea that they were no more than variations in severity; the underlying disease process was the same. As with the division into different types of smallpox, writers differed over the number and identity of the stages. In the eighteenth century, all fevers were divided into four stages - eruption, suppuration, maturation and declension - and many writers on smallpox borrowed this division.³⁶ However, Helvetius had subdivided the method of treating each type of smallpox into three stages, while Thomas Fuller identified five.³⁷

Thomas Fuller's Exanthematologia, published in 1730, was by far the longest and most detailed work on smallpox of this period. While earlier

pamphlets ran from ten to a hundred pages, Fuller's was a massive four hundred page monograph. It provided immensely detailed instructions on the treatment of smallpox. Fuller began by listing the types of therapy, and their effects, but most of the text was taken up by his method of cure in each of the five stages. In the first stage - assimilation - the variolous matter was formed. At this point, it was not clear if the patient was suffering from smallpox, and little could be done except switch to a low, cool diet. During the second stage - concoction - when the infective matter, acted on the blood to produce morbid smallpox matter, bleeding, purging and vomiting were used to reduce the quantity of infective matter. In the third stage - eruption - in mild cases therapy was more likely to disrupt the disease process than to forward it. In more severe forms, bleeding, cooling medicines, and opiates should be prescribed to control the fever. During the fourth stage - augmentation - diluting and cordial medicines should be given to support the eruption. In the final maturation period the physician had to deal with any particular symptoms - a secondary fever, pustules blocking the mouth and throat, a salivation or swellings, and use therapies to stop the reabsorption of smallpox matter back to the centre of the body.³⁸

Fuller left little to the physicians' initiative. He set out prescriptions for suitable medicines and gave precise descriptions of the circumstances in which therapies should and should not be used. For example, bloodletting was unsuitable for the very young, very old, weak, 'worn out', cachetic, consumptive, hydroptic, hysteric, patients with low spirits, poor blood, who were apt to sweat or usually fainted when bled, and women about to menstruate. It could safely be prescribed for healthy young men, patients

prone to inflammatory diseases or those who had lived well. It was of particular benefit in spring and autumn, and should be performed as early as possible.³⁹ Sometimes, the level of detail reached the absurd. When describing the best conditions for the patient, Fuller was not just concerned with the temperature of the room or the need for fresh air. He directed that the locks and hinges of the doors should be oiled to prevent any irritating squeaking, that the chimney should draw well, and that the fires should not be of turf or charcoal. He even reminded practitioners that the patient should remove any rings at the onset of disease, before the fingers became swollen. If this had been forgotten, he supplied instructions for safely filing them off.⁴⁰

These later texts on smallpox, with their detailed methods of treatment seemed to be moving away from more traditional forms of practice which emphasised the physicians' skills in untangling the multitude of factors which influenced the disease course, and prescribing the best - and safest - programme of therapy. However, although physicians developed treatment plans, these could not be applied indiscriminately. Therapy still had to take account of a wide range of factors. The environment had a strong influence on the disease. Smallpox was always worse in spring and autumn. The appropriate therapy also depended on the prevailing climate; cordials were beneficial in the north, where the air was 'gross' and the regions cold and marshy, but in the south, where the air was brisk, acids and cooling medicines were required.⁴¹ The patient's constitution, age, sex, and conduct also affected the severity of the disease; women and children generally had mild cases, but strong, robust young men, who drank heavily suffered badly.⁴²

Physicians were therefore still able to argue that cases of smallpox required the attendance of a physician, able to carefully adapt therapy to the circumstances of each patient.⁴³ Other groups of practitioners, lacking their particular knowledge and skills, were far less capable of dealing with such a complex and dangerous disease as smallpox. Thomas Apperly warned of the dangers of trusting apothecaries with the care of smallpox patients. Though an apothecary well acquainted with a family might apparently know more about the patient's constitution, he did not understand the implications of it in the same way as a physician.

Constitutions daily alter; and when a Person is ill, the Judgment is to find out the present Constitution or State of the Disease, and be able to prescribe proper Remedies, which he that is the best Physician is the most likely to do, tho' he never saw the Patient before, provided he takes Care to enquire whether the Patient has any Idiosyncrasy or natural Antipathies, and if any particular Medicines disagree; which...may soon be learnt from an Apothecary or any Person that is well acquainted with the Patient.⁴⁴

The new methods of dealing with smallpox therefore did not undermine the physician's position at the head of the medical profession. A few practitioners expressed a concern that texts written in English and giving explicit instructions on how to treat smallpox, would teach other, less skilled, practitioners how to deal with the disease. Theophilus Lobb wrote "Some Persons have objected that Writing physical Books in *English* is the way to make QUACKS".⁴⁵ In his translation of writings by authorities on smallpox Richard Holland apologised

Perhaps it may be objected, that by explaining this Distemper so fully, I may teach those not qualified to Practice to avoid some Errors, and to manage the Disease with more Caution and Judgment; and thereby do

an injury to my Profession, which is already invaded more notoriously than all others.⁴⁶

But, he argued, quacks were by definition ignorant, and anyone who took the trouble to read his work was therefore not a quack.

However, it seems that the physicians' fears for their practice did not materialise. There was little friction between physicians and apothecaries over smallpox practice. Apart from Thomas Apperly, only one other physician felt the need to defend the groups' role. Edward Strother complained that it was popularly believed that physicians, "empiricks" and nurses were equally successful in treating the disease.⁴⁷ Generally, physicians were tolerant of other practitioners. In the introduction to his Treatise on the Small-Pox in Two Parts of 1731, Lobb argued that there were not enough physicians to fulfill the demand for medical care.

If we consider the small Number of *regular* PHYSICIANS in most *Counties*, and that they are distributed commonly into but three, or four of the principal Towns; and so distant from many Parishes that it is impossible for them...to visit one half of the Sick; we shall see Reason to acknowledge that there is a necessity of allowing *Apothecaries* the Liberty of practicing; and that without it, Multitudes of People must be destitute of Remedies, when they fall under Distempers.⁴⁸

Physicians therefore had a duty to teach apothecaries how to deal with smallpox cases.

It is therefore an Act of great Humanity; it is doing what is pleasing to God, and what is exceeding beneficial to the Publick, to instruct *Apothecaries*, and indeed all, who have the Direction of sick Persons, how they should manage them for their Recovery.⁴⁹

Lobb was not in favour of apothecaries taking over the management of all smallpox cases; he stressed that wherever possible a physician should be engaged. Only if a physician was unobtainable, should an apothecary be

called in, or failing an apothecary, a nurse should be engaged.⁵⁰ His book was not intended to teach apothecaries how to be physicians

by the instructions contained in it, the Heads of *Families, Apothecaries, and Surgeons* in the *Countrey* [sic] (where, in many Places, they are under a Necessity of *practicing Physick*) will become able to avoid those *Methods* which have destroyed the Lives of many under the *Small pox*;...Though it cannot with Reason be thought, that they are able, in the various Cases of Danger, to conduct the *Sick* through the several *periods* of the Distemper with that *Propriety, and Advantage*, which may be hoped for from the Advice of a skilful [sic] PHYSICIAN.⁵¹

Lobb then proceeded to set out the method of practice which apothecaries should use in treating smallpox. Although the therapies were much the same, the method was quite different from that of physicians, making little use of theory or descriptions of the disease process. There was no guide as to how to treat patients according to their individual constitutions. Instead he simply described the symptoms of smallpox and set out a wholly disease oriented method, using the pulse and the level of fever as the main guides to treatment. It is hard to know if this method bore much resemblance to that used by apothecaries; Lobb may well have exaggerated the difference between the methods of physicians and apothecaries to emphasise the physicians' superior skills.

Lobb advocated a cool diet, but patients should be allowed to eat the sort of foods they wished - the best guide to what they found digestible - and provided recipes for gruels, panada, wine whey, and possets. If the pulse fell, then warming foods and drinks should be given; if high then a more cooling regimen should be followed.

The application of therapy was similarly simplified. Lobb split the disease course into four stages and set out simple rules for treatment of each. In the first stage, six to ten ounces of blood should be drawn, according to the degree of plethora of blood. A list of the signs of plethora was provided. Rule two was to vomit the patient, if there was any 'foulness' of the stomach and Lobb described the symptoms which indicated such 'foulness'. Rules three and four dealt with the symptoms which indicated the use of glysters and purges. In the second stage, practitioners should assist the eruption and promote the natural tendency to spit by diluent and attentuant medicines. In the third stage, pectoral decoctions were used to increase the perspiration and spitting. The final stage required only cordials if the eruption did not progress, and purges once the pocks had scabbed.⁵² As an additional guide, he also provided a list of symptoms, their causes, and appropriate measures to be taken, and finished the work with fifty case histories, illustrating the use of the method.

Smallpox texts, therefore, indicate that there were fundamental changes in medical theory and practice well before the 1760s. As early as the 1720s, physicians were breaking away from their allegiance to classical texts, and using clinical observation to suggest new theories of smallpox causation and new, more detailed and more complex methods of treating the disease. Although physicians continued to stress the need to adjust therapy according to the patient's constitution, their texts provided detailed methods for the treatment of smallpox modeled on the progress of the disease. They explained not only the appropriate methods of treatment and their effects, but the sequence in which they should be used, the circumstances in which

they were appropriate, and even gave prescriptions. Although this did not immediately create any conflict between physicians and apothecaries, this new style of practice was to lead to conflict over inoculation in the 1750s.

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Chapter Three: Inoculation Established 1730-1765

Given the close connection between smallpox theory and practice and inoculation techniques established in the 1720s, it is not surprising that new forms of inoculation practice after 1729 also mirrored changes in smallpox treatment. Just as writers on smallpox developed increasingly routine methods of treating patients in the 1720s and 1730s, authors on inoculation practice in the 1740s and 1750s created uniform methods of preparing patients. But whereas the new forms of smallpox treatment presented no threat to the physicians share of smallpox practice, these works reveal, in stark detail, the dilemma facing eighteenth- century physicians. Their continuing allegiance to humoral theories and to a therapeutics carefully tailored to the individual patient allowed them to defend their status at the head of the medical profession, but at the cost of limiting their patient pool.

This period also saw inoculation finally established as a routine form of medical care. The practice languished during the 1730s, but revived during the 1740s and by mid century met with general approval from all ranks of the medical profession. At this time, in a striking parallel with smallpox texts published twenty years earlier, practitioners began to move away from highly individualised practice, and to develop more uniform methods of preparing patients for inoculation. There were different bases for these development; whereas smallpox cases were grouped according to the form of the disease, the correct method of preparation was determined by the patient's age and

constitution. But, as in the treatment of smallpox, this allowed writers to set out increasingly detailed directions for treatment.

These new methods of inoculation proved to be a double edged sword for the physicians when other groups of practitioners began to encroach on their monopoly of preparing patients for inoculation. On the one hand, they succeeded in convincing the public that they were the group of practitioners best able to direct preparation. On the other, there were persistent complaints that the physicians were charging such high fees, that very few patients could afford to put themselves under their care. Surgeons and apothecaries, using simpler methods, increasingly took over inoculation by the 1760s, not just among the middle ranks of society, but among rich patients as well.

In spite of all the furore surrounding the adoption of inoculation, it had never become popular in the 1720s. In the following decade, it made little further progress, and may even have declined, although the lack of comprehensive records makes it impossible to determine precisely. After 1729 The Royal Society stopped collecting reports of inoculation, and there were few pamphlets written on the subject during the 1730s - which in itself suggests that inoculation was not widely employed. Contemporary magazines and journals contain only scattered reports of the practice; they record that small numbers of inoculations were performed in Dumfriesshire in Scotland, in Ireland, Wales, and London.¹

References to inoculation in other works show that medical practitioners were still divided in their opinions. A handful of writers, including Thomas Fuller and Theophilus Lobb approved wholeheartedly of

the procedure, while David Hartley argued that it should be used to halt an epidemic which had broken out in the town of Bury.² Most, like William Hillary, were more cautious. He believed inoculated smallpox had not been proved to be consistently milder than the natural disease.³ Other physicians believed that the experiment had failed. John Allen, for example, summed up the history of inoculation:

it is wonderful with how great an Expectation it was received amongst us, and with how much industry it was cultivated, it presently grew incredibly famous... although it flourished under such prodigious Encouragement, and was supported by such great Examples, it did not gain any Credit, or get any footing amongst the common sort of People. It does not seem rightly to quadrate with the *Genius* of our People and their way of Thinking.⁴

To Martin Warren the practice had been "totally discredited and rejected" and "justly exploded and condemned by all rational Men".⁵ Francis Clifton, described it as "hazardous and unwarrantable".⁶

However, just when inoculation seemed to have sunk with little trace, it revived and within twenty years was routinely used. The resurgence of inoculation, like its introduction, came in response to increasing smallpox incidence. Although London smallpox deaths declined between 1741 and 1746, death rates nationally rose above birth rates between 1741 and 1743 as the result of epidemic diseases, including smallpox.⁷ (see Appendix I) Records from outside London show a number of severe outbreaks of smallpox: Edinburgh suffered high levels of smallpox mortality throughout the late 1730s and early 1740s.(See Appendix II) This was followed by a series of severe smallpox epidemics which swept the country between 1751 and 1753. In London in 1752, smallpox caused over seventeen percent of all deaths, the

highest ever recorded. High levels were also reported in Scotland, even the small county town of Perth experienced one hundred and five deaths.⁸

Inoculation revived first in the south west of England, which was particularly badly hit by epidemic smallpox; the disease was reported to be 'raging furiously' around Portsmouth in 1742. John Andrew, an Exeter physician reported that inoculation had been introduced to the city in 1741 and to the surrounding county of Devon the following year. A Totnes surgeon also began inoculating in 1742. As a result, two thousand persons were inoculated around Portsmouth in 1742; double the number of inoculations for the whole country in the 1720s.⁹

Thereafter, the use of inoculation spread steadily. In Sussex, Thomas Frewen inoculated his own children in 1746 and by 1749 claimed to have inoculated over three hundred patients.¹⁰ In 1747 Charles Perry recorded the use of inoculation in Warwick and Stourbridge in the English Midlands.¹¹ In Chelmsford, there were two hundred and ninety cases of smallpox in 1752, and ninety-five deaths; its citizens soon took up inoculation.¹² In the same year in Norwich over a hundred inhabitants were inoculated.¹³ The following year four hundred and twenty two persons were inoculated in Salisbury, one hundred and twenty seven at Bradford-upon-Avon and three hundred and nine inhabitants of Blandford, Dorset.¹⁴

By this time any lingering doubts among medical practitioners as to the efficacy of inoculation had vanished. In 1743, James Kirkpatrick published an account of the successful use of inoculation in Charleston, South Carolina five years earlier.¹⁵ In 1747, Charles Perry advocated the use of inoculation in his Essay on the Small Pox, while in the preface to his Practice and Theory of

Inoculation published in 1749, Thomas Frewen criticised opponents of the procedure for "making an ill-natured Bounce" at occasional failures of inoculation.¹⁶ He reported that

the Success, with which it has been attended for some Years past, seems, at this Time, to have established it on so firm a Basis, as to stop the Mouths of its Antagonists, and to let it make its own Way.¹⁷

In the same year, John Swan declared "the practice is now so well established, and become so general...that the safety, expediency, and advantage of it, cannot with any colour of reason be called into question."¹⁸ The acceptance of inoculation was also signaled by its inclusion in standard medical works. Samuel Sharp added a description of inoculation to the fourth edition of his Treatise of the Operations of Surgery published in 1743. The 1749 edition of The Entire Works of Dr. Thomas Sydenham included a long note on the history and practice of inoculation.

More practically, this general endorsement of inoculation led to its use in institutions. In 1743, the London Foundling Hospital decided to routinely inoculate children on admission. This did not involve very large numbers; in 1748, the Gentleman's Magazine reported that seventeen children had been inoculated.¹⁹ In the early 1750s, the London Smallpox Hospital began to provide inoculation free of charge. The hospital had been founded in 1746 to treat cases of smallpox, which were excluded from other institutions for fear that they would spread the disease to other patients. In 1753, the hospital set aside a special house at Islington for the preparation of patients for inoculation; after the operation they were transferred to a house at Cold Bath Fields. By the end of the decade, the Hospital was carrying out over two hundred inoculations a year.²⁰

In spite of this, the controversy over inoculation did not immediately end. In France, the introduction of inoculation provoked strong opposition, which culminated in a ban on the practice in Paris in 1763. There were also persistent religious objections to inoculation, which were expressed by the Reverend Thomas Delafaye. In 1753, he published two pamphlets, reiterating Edmund Massey's objections that it was blasphemous to deliberately endanger life by inoculation and to interfere with the workings of Divine Providence.²¹

The great majority of British practitioners and clergymen, however, united in defence of the practice. The anonymous author of A Letter to a Doctor of Sorbon reassured his French colleagues of the successful use of inoculation in Britain.²² Noah Bolaine and Daniel Cox set out the arguments as to why inoculated smallpox was much milder than the natural disease. The Reverend David Some even produced an elaborate mathematical formula to calculate the relative risks involved in natural and inoculated smallpox.²³ Isaac Maddox, the Bishop of Worcester produced a highly influential pamphlet arguing that inoculation was consistent with proper religious conduct. It was a Christian duty to protect one's own life, he argued, and since inoculation saved lives, and had been revealed by God, it was a religious duty to practice inoculation.²⁴

Inoculation received a final seal of professional approval in 1755, when the Royal College of Physicians of London officially endorsed the practice. In response to continued French criticism of the procedure, the College issued a formal statement; it held that

in their Opinion the Objections made at first to it have been refuted by experience, and that it is at present more generally esteemed and Practiced in England than ever, and that they Judge it to be a Practice of the utmost benefit to Mankind.²⁵

Medical men were not the only group interested in inoculation; the new periodical press reflected a growing popular enthusiasm for the procedure. The Gentleman's Magazine, which began publication in 1731, regularly included articles on contemporary medical topics, contributed by both patients and practitioners.²⁶ The magazine was generally in favour of inoculation, and carried several editorials encouraging its use. By 1745, hardly a month passed without some reference to the practice; during the 1752 epidemic it printed thirteen items on smallpox and inoculation. A similar pattern of articles appeared in the Scots Magazine, the northern counterpart to the Gentleman's Magazine, from its first year of publication in 1739. Periodicals provided a forum for a wide range of issues connected with inoculation from reports of its use as far afield as America and the West Indies, to discussions of inoculation technique, to a request for advice from a gentleman, who wished to know whether he should have his three daughters inoculated before sending them to boarding school.²⁷

The growing number of pamphlets on inoculation, published in the 1740s and 1750s, illustrate developments in the practice which parallel those that occurred in the treatment of smallpox some twenty years earlier. In the 1720s, pamphlets described how practitioners had performed inoculation in particular cases, but there were no works instructing practitioners as to how they should go about the procedure. As we have seen in chapter one, pioneer inoculators developed their own techniques of preparation and inoculation from these descriptions. In the late 1740s and early 1750s, a number of works

explaining the proper inoculation procedures appeared, and reveal significant changes in technique. These reflected practitioners growing experience with the procedure and were also influenced by the new theories of smallpox contagion.

Just as physicians no longer believed that the source of infection influenced the severity of the resulting smallpox, inoculators in the 1750s were less concerned over the origins of the infective matter used for inoculation in determining a favourable outcome. In the 1720s, inoculators had argued that one of the reasons why inoculation was safer than natural disease was that the infective matter was taken from someone suffering from a mild case of smallpox. By comparison, inoculators in the 1750s had developed an almost cavalier attitude. Any infective material could be used for inoculation. Mature pus or watery lymph from an incision site were equally capable of infecting a patient with smallpox. Matter could be taken from a mild or malignant case of natural smallpox, and even from patients suffering from other diseases, although this should be avoided if at all possible.²⁸ Inoculators were still debating whether the quantity of matter had any effect on the disease; some argued that a smaller amount must produce less morbid matter, others claimed that it was immaterial, repeating an analogy used in the 1720s: that both a torch or a spark were equally capable of igniting a trail of gunpowder.²⁹

Either as a corollary to the downplaying of the role of the specific infection in determining the severity of natural and inoculated smallpox, or simply because they found that it did not work in practice, later inoculators abandoned techniques to encourage suppuration of the inoculation sites. In

the 1720s, inoculators had increasingly applied techniques to provoke a discharge from the incisions, in the belief that it removed morbid smallpox matter and ensured mild smallpox. In the 1740s, they continued to hold that some discharge was a necessary and natural part of inoculation, and that it was dangerous to stop the flow of matter.³⁰ However, the quantity expelled was now held to bear little relation to the severity of the case. In 1749, for example Thomas Frewen wrote "the Discharge, whether little or much is to be looked upon as critical".³¹ The effusion of even a small quantity of matter was believed to protect the patient against a dangerous secondary fever in the later stages of smallpox. Inoculators stopped making deep incisions, which tended to produce swelling and inflammation, and abandoned the use of issues to keep the inoculation sites open and discharging. They reduced the size of the incisions from around an inch to less than half or even a quarter of an inch and replaced the irritating 'digestive' dressings with simple, soothing ones of lint and 'basilicon', an ointment of plant extracts. Some practitioners suggested using no dressings at all, so as to better observe whether or not the inoculation had 'taken'.³²

The new form of inoculation also reflect a more general trend away from highly individualised practice to methods of inoculation built around the uniform effect of drugs on the body fluids. Preparation - the manipulation of the body fluids into a healthy balance - had been routinely used in the 1720s, although the form varied widely, with each practitioner favouring different combinations of drugs and diet. Practitioners in the 1740s and 1750s continued to believe that the severity of the smallpox was determined by the state of the body fluids, particularly the blood.³³ Therefore the most effective

way to ensure mild smallpox was to prepare the patient through a regimen of diet and medicines. Just as practitioners began to group together patients suffering from the same type of smallpox and applied the same sequence of therapy in all cases, inoculators divided patients by their age and constitution and used the same form of preparation for each.

As late as 1750, writers continued to give very vague directions. Adam Thomson, for example a practitioner in Philadelphia, published Discourse on the Preparation of the Body for the Small-Pox in 1750. Thomson dwelt on a theoretical explanation of smallpox etiology and from it, he deduced a set of "indications" which served as a basic guide to therapy; practitioners should keep the blood vessels soft to ensure a free circulation and counteract the inflammation and putrefaction produced by infection and so minimise symptoms. However, because each case represented a unique configuration of patient and disease, Thomson gave no precise instructions as to how to treat patients. He wrote "I have purposely avoided giving any formal Directions about the Preparation, thinking it sufficient to propose the general Intentions to be pursued, which every judicious Physician easily knows how to execute, and adapt to different Constitutions."³⁴

Thomson's text was highly unusual; every other text published around this time set out a precise inoculation procedure. The first step was the exclusion of unsuitable candidates for inoculation. As early as 1731, Thomas Fuller warned that teething children should not be inoculated. At this time, their bodies were in a highly irritable state and the operation was likely to induce dangerous convulsions or a "teething fever". Some practitioners advocated inoculating very young infants - William Heberden suggested

inoculating infants just four weeks old and Matthew Maty proposed inoculating just after birth, but most physicians argued that smallpox was often fatal to such young children. In addition, there were difficulties in dealing with such young children. Although they were unafraid of the procedure, John Andrew reported that "the Anxiety of the nurse frequently spoils her milk".³⁵ Infants were also notoriously difficult to treat should the smallpox prove serious.³⁶ It was therefore better to wait until after children had cut their first set of teeth and inoculate between the ages of three or four and twelve. They also advised against inoculating pregnant women, who occasionally miscarried after inoculation, or individuals over the age of fifty.³⁷

In addition, patients with certain chronic conditions - which indicated that their body fluids were severely unbalanced - should not undergo inoculation. Writers often gave exhaustive lists of unsuitable candidates. David Schultz, a Swedish physician sent by his government to observe inoculation at the London Smallpox Hospital reported that patients with skin complaints, those who had just recovered from measles, had "indurated" glands, ricketts, chlorosis, cachexy, obstructions, inflammations or ulcerations, were short of breath or suffered from consumption, scurvy, venereal disease or were 'Great Drinkers' were unsuitable for inoculation.³⁸ Some forms of behaviour also rules out candidates. As Thomas Fuller delicately phrased it; those who had overheated themselves with Bacchus or Venus should not be inoculated.³⁹ Some practitioners were less scrupulous. John Andrew claimed to have inoculated scrofulous patients successfully and

reported that a surgeon named Hodges had inoculated patients with 'scorbutic, strumous and leprous Habits'.⁴⁰

Some writers favoured inoculating at particular times of the year. Frewen argued that although inoculation could be successfully practiced throughout the year, it was best not to inoculate in the spring, when smallpox tended to be malignant.⁴¹ On the other hand, both Schultz and Andrew preferred inoculation in the spring and autumn, thus avoiding any extremes of heat or cold.⁴²

Authors advocated a more standardised and shorter preparation than that used in the 1720s. Patients followed a regimen of diet and medicines for two to four weeks before inoculation, although William Heberden described a preparative course lasting only 'a few days'. The preparative diet was similar to that prescribed by the pioneer inoculators in the 1720s. Patients were forbidden to eat red meats or salted foods or to drink fermented liquors. Instead they were allowed 'opening Things' - broths containing vegetables, fruits, including apples, 'plumbs', 'pruants', raspberries, and cherries, and all sorts of puddings - sago, fruit pies, rice milk, milk puddings, gruels, panado, 'roasted' apples, and figs, washed down with milk, green tea, barley water, and small beer. Some practitioners allowed a more generous diet than others. Frewen and Andrews allowed their patients to eat light meats - chicken, fish or rabbit - every second day, but Schultz described a stricter diet, without any animal foods, not even butter or cheese.⁴³

Texts also set out the correct sequence of drugs to be used, the type of medicines and the number of doses. In the 1720s, practitioners prepared their patients using vomits, purges and bleeding according to their own preferences

and the individual constitution of each patient. By the 1750s, purges containing mercury and antimony were the standard medicines used in preparation.⁴⁴ As in the treatment of smallpox, writers gave more and more precise instructions as to the form of medicines, most of which contained mercury and antimony. Aethiop's mineral, calomel, and James' powder were most commonly recommended.⁴⁵ Most writers advocated giving three or four purges interspersed with smaller doses of calomel and antimonials. Schultz described British practitioners giving calomel at night, which was purged off the following morning. He also reported that practitioners gave a course of smaller alterative doses and a 'decoction of woods' - preparations of guaicum or sarsaparilla - every day for a fortnight, plus purges every three, four or five days.⁴⁶

Although these texts gave detailed instructions as to the method of preparation, they warned that it should not be applied indiscriminately in all cases; the practitioner had to take into account the unique circumstances of each patient. Thomas Frewen warned "Medicinal Regimen, of some Sort, before Inoculating is for the most Part, necessary, though not always; and this is to be judged with Regard to the Age, Habit of Body and other circumstances of the patient."⁴⁷ However, Frewen and all later writers provided rough guidelines for preparing patients of different ages and constitutions. Children generally required less preparation. A low diet was necessary, and some practitioners recommended mild purges of rhubarb and jalap, a purgative root. John Andrew advised that all children suspected of having worms should be given mercurial purges, to guard against the possibility of a dangerous 'worm fever'.⁴⁸ Adults of a weak or puny constitution were also

given fewer, milder purges, and allowed a fuller diet. In addition, they were dosed with peruvian bark - a medicine first used in the treatment of smallpox in the 1740s - to improve the condition of their blood.⁴⁹ On the other hand, sanguine or plethoric patients required bleeding, while gross or robust patients were prescribed a more rigorous preparation with a stricter diet and stronger purges.⁵⁰

These different methods were set out most comprehensively in James Kirkpatrick's Analysis of Inoculation. Published in 1754, under the sponsorship of Issac Maddox, the Bishop of Worcester. It was described by the Monthly Review as the "most perfect [work] on this subject."⁵¹ It rapidly became a standard authority in the field, and was widely cited. In some ways, Kirkpatrick's work was the equivalent of Thomas Fuller's massive tome on smallpox published some twenty years earlier. Like Fuller, Kirkpatrick went into his subject in exhaustive detail; for example, he spent several pages discussing whether or not patients undergoing preparation should be allowed to eat asparagus.⁵² After dealing with smallpox theory, incision techniques, and suitable candidates for inoculation, Kirkpatrick set out an exhaustive programme of therapies for the preparation of different types of patient. Age was a primary consideration. Unweaned infants required gentle purges only if constipated; over the age of two, children should be purged to remove worms. By the age of six children were required to follow the same low diet as adults. Adults had to be prepared according to their constitution. Bilious patients were 'puked' and bled, and were advised to use more acids - principally fruit juices or vinegar - in their diet. Sanguine patients were bled, sometimes repeatedly, and received stronger purges containing calomel. They

had to consume less butter, milk and eggs. If "very sanguine", then they should drink no milk at all. Kirkpatrick warned that "atrabilious" patients required an even more particular regimen although he gave no specifications as to exactly what this should be.⁵³

Even though Kirkpatrick provided precise instructions for preparation, he still expected practitioners to make minor alterations to the regimen according to the patients circumstances. The preparative regimen, for example, should reflect the patient's usual diet. If patients were used to eating large amounts of meat or drinking quantities of wine, then they were allowed to reduce their intake, rather than abstain completely.

Although the physicians developed more routine methods of preparing patients, they still had to insist on the need for preparation tailored to individual constitution in order to defend their status. It was the cornerstone of their rationale for maintaining a central role in inoculation particularly and in defending their status more generally.

There had been occasional complaints that surgeons were conducting inoculation in the 1720s, although the Royal Society records suggest that the divisions in practice were usually observed. By midcentury, more and more rank and file practitioners - surgeons and apothecaries - were conducting inoculation, in spite of a chorus of disapproval from the physicians. In 1750, Adam Thomson grumbled "almost everyone who knows how to handle a Lancet [is] intrusted with the whole Management of it."⁵⁴ James Kirkpatrick complained "tho' the most eminent Physicians were consulted at first, with regard to the Introduction and Practice of this Method, there appears to have been a pretty early Disuse of them".⁵⁵ By 1754, he reported that surgeons "in

general get themselves employed in all the Circumstances previous to Inoculation, and indeed throughout the Whole of it".⁵⁶

The physicians claimed that surgeons had taken over their role in inoculation practice by denying the need for preparation.

For by what other means could those Gentlemen, whose useful Profession is supposed to be confined, at least in *London* and other large Cities, to manual Operations and external Healing, procure so great a Proportion, not to call it a Monopoly, of this Practice, but by positively pronouncing, with their utmost influence, that the Operation never, or very rarely indeed, required any medical Preparation previous to it, and by asserting also, that it was much oftener prejudicial than not.⁵⁷

The same idea was expressed in 1758 by the anonymous author of A Serious Address to the Public concerning the most probable Means of avoiding the Dangers of Inoculation - the 'most probable means' of the title being to employ a physician. The author claimed that the idea that preparation was not required reflected only the surgeons' ignorance. It

has been embraced with the greatest Avidity, and most zealously propagated by the Surgeons, who found they could profit themselves by the Opinion, it being vastly convenient, as they have little Knowledge of internal Medicine...wherefore they are very glad on every Opportunity, to say there is no Necessity for them.⁵⁸

He accused the surgeons of deliberately attempting to cut the physicians out, by suggesting that infants were the best candidates for inoculation: "hereby they propose to exclude more effectually the Physician, as there is not much to be done for the Patient at this Time of Life by Medicines".⁵⁹

By neglecting preparation, it was alleged, surgeons and apothecaries were endangering their patients' lives. The key to a safe and successful inoculation was a suitable preparation, adapted to the requirements of each

patient, which only the physician, with his understanding of the complex workings of the body in health and disease could prescribe.⁶⁰ James Kirkpatrick, one of the most vehement defenders of the physicians, even though his own medical qualifications were somewhat dubious - he had first published as a surgeon in America but at some point began to style himself M.D. - warned that the failure to take account of "the essential Diversity of different Constitutions and Temperaments" had had fatal consequences.⁶¹

Physicians called for a return to the old division of practice. Kirkpatrick summed up: "Briefly, the proper Disposition of a Body for the Reception of an acute Disease, and the treatment of it in such a Disease, are Matters of medical Consideration. An Issue, Wound, or visible Ulcer are the Subjects of chyrurgical Application."⁶² The anonymous author of the Serious Address recommended that "If a Surgeon is used at any Time, confine him to the Works of his Profession, and provide a Physician to direct the Management, Diet and Medicines".⁶³

The surgeons and apothecaries fought back. In his Remarks on a Serious Address to the Public, Thomas Cooper argued that surgeons were competent to care for inoculated patients because the characteristic pocks were really small abscesses, which were traditionally treated by surgeons.⁶⁴ In 1754, the year that Kirkpatrick's Analysis appeared, James Burges, a London apothecary, published An Account of the Preparation and Management necessary to Inoculation. He mocked the physicians for their learned posturing.

How many books on the subject of physic have been published, of great learning and ingenuity, without any knowledge? How many volumes full of deep speculation, that have amused greatly, without conveying

any instruction? What works have not so many learned professors published, what subject have they not exhausted; yet how little have they added to the improvement of their profession? and how little wiser have they made mankind?⁶⁵

Burges' work attempted to avoid such idle speculation, and "endeavoured from his own observation or the general practice to form such a system of management of the inoculated person as would be conducive to their security."⁶⁶

In practice, like the physicians he criticised, Burges made use of theory to guide his practice. In smallpox, infectious particles blocked the small vessels, causing pain and fever, and eventually producing the characteristic pocks. Preparation - which was the main reason why inoculated smallpox was consistently mild - was intended to keep the body "open", with natural levels of perspiration and evacuations, which in turn kept the circulation free and the pores open. However, where physicians set out complex programmes of preparation, Burges argued that the preparative regimen should be very simple; "I think the whole may be included in three words, *viz.* temperance, quiet, and chearfulness[sic]."⁶⁷ He set out only one programme of diet and medicines. For three weeks before inoculation, both adults and children should keep to a vegetable diet with meat every other day. Three purges of manna, senna and metal salts were given at three-day intervals.⁶⁸

For the most part, physicians won the battle of words, succeeding in convincing the public that they were best qualified to conduct patients through inoculation. Although one correspondent to the Gentleman's Magazine complained that physicians had overly complicated inoculation, the public seem to have been generally convinced that the physicians were better qualified to conduct inoculation. Reviewers in the literary magazines,

expressed little confidence in the surgeons' skills in conducting inoculation.⁶⁹ Burges' pamphlet, for example, was criticised for its 'superficial execution'. By not explaining how preparation should be adapted to individual needs, Burges encouraged negligence among other practitioners. The review ended in doggerel:

So modern 'pothecaries, taught the art
By doctor's bills to play the doctor's part,
Bold in the practice of mistaken rules,
Prescribe, apply, and call their masters fools.⁷⁰

In a similar vein, another review suggested that the surgeons were 'incompetent judges' when it came to handling inoculated patients.⁷¹ They feared for the future of inoculation, if such practitioners were allowed to carry on their inoculation practice.

I am concerned for [inoculations] honour, this cannot fail to be impeached if inoculation is suffered to be abused, and to lose its credit, which must depart, if it is not performed under the inspection of such, who are most likely to be well acquainted with the small-pox, both natural and artificial.⁷²

To win the battle of words was one thing; but to win the practice of practice was another. Although the physicians succeeded in convincing the public of their ability to conduct patients through inoculation, they failed to regain their monopoly of preparation. Many writers complained that the physicians demanded high fees for inoculation, thereby pricing themselves out of the growing market for inoculation. They suggested that if the physicians wished to retain their monopoly of caring for inoculated patients, they had to reduce their fees and offer free inoculation to the poor.⁷³

Although such comments suggest that the physicians inoculated the rich, with all the rigmarole of individual regimen, while surgeons inoculated the poor using standardised methods and charging lower fees, the records of practice show that both groups were in fact competing for the same clients. To save their patients the expense of employing two practitioners, physicians overcame their traditional dislike of manual operations and took over the surgeons' role in inoculation. "If it is thought convenient to employ only one [practitioner]," suggested the author of the Serious Address, "the most knowing should be preferred, I mean the Physician, lest for Want of due Caution, Diet, Management, and proper Medicines, the Patient runs greater Risk than there is need of, or loses his Life by the Transaction."⁷⁴ Kirkpatrick also reported that "for several Years past some eminent Physicians in *London & c.* in Resentment of the Surgeon's Incroachment on the medical Conduct of this Practice, for an Incroachment it indisputably is, have made the little Scratches or Incisions themselves."⁷⁵ Even John Morgan, an ambitious and priggish young physician, while staunchly refusing to take surgical cases or dispense medicines, made an exception in the case of inoculation.⁷⁶ In 1765, he described his manner of practice.

I do not mean, however to refuse to inoculate [sic] for the small-pox, where my patients or their friends object to employ another hand to make the incision. This may frequently happen, although there is no more difficulty or art required in it than in cutting an issue...or than in cupping and bleeding.⁷⁷

Not surprisingly, the physicians' professional bodies took a much stricter line. In 1765, in response to the collapsing of the old divisions between groups of practitioners, Edinburgh's Royal College of Physicians passed a series of statutes, defining the physicians' proper practice. They warned that

no practitioner "whose common business it is either to practice Surgery in general, or Midwifery, Lithotomy, Inoculation or any other branch of it in particular" would be admitted as fellows. Any fellow found undertaking such practice would be struck from the College roll.⁷⁸

The physicians did not enjoy a monopoly of inoculation amongst the upper classes; casebooks show surgeons charging large amounts for inoculation. James Ford, a prominent Bristol surgeon charged between £5 and £20 for inoculation in the 1750s. In 1757, William Pulsford, a Somerset surgeon, charged four guineas to inoculate the wife of the Honourable George Hamilton. Although prices generally declined over the century, even in the late 1780s one practitioner recorded inoculation fees of four guineas in London and two guineas in Yorkshire.⁷⁹

Surgeons were also able to attract wealthy patients to their 'inoculation houses'. From the 1720s, inoculated patients had boarded with practitioners to prevent them spreading smallpox to susceptible family members.⁸⁰ In mid century, a number of surgeons set up special houses where patients could be isolated during inoculation. The fees which covered food, board, and the attendance of a practitioner and a nurse for the month or so required for the procedure were very high. In the late 1750s, Robert Sutton charged seven guineas for inoculation at his house, well beyond the means of any but the gentry.⁸¹

In the mid eighteenth century, the lowest price for inoculation was 10/6, the same fee as bloodletting or the lancing of an abscess.⁸² This was a substantial amount, and in 1752, a writer to the Gentleman's Magazine complained that the cost of inoculation still meant that many ordinary people

- farmers and tradesmen - could not afford to inoculate their whole family, and that it prevented the poor from adopting the practice.⁸³ A correspondent to the Scot's Magazine echoed his sentiments, explaining that the costs meant that inoculation was unknown in the Highlands.⁸⁴

Even so, Alexander Monro's survey of inoculation practice in Scotland in the 1760s, shows that inoculation had become firmly established among a large proportion of medical practitioners, and at least some sections of the community. In 1765 Alexander Monro, *primus* the professor of anatomy at the Edinburgh Medical School compiled the Account of the Inoculation of Smallpox in Scotland in response to a request for information from the Paris Faculty of Medicine, who were considering lifting their ban on inoculation imposed in 1763. Monro replied to their questions on the extent and success of inoculation, and added a table of inoculations performed in Scotland, which provides a valuable measure of the extent of inoculation practice. Monro collected his data through personal contacts in the small, close knit Scottish medical community, and his survey appears to be remarkably complete, covering both the cities and remote rural areas.

Monro found a high proportion of Scottish practitioners engaged in inoculation by 1765. The eighty-eight practitioners recorded by Monro represent almost a third of the country's medical men - fifteen years later the Medical Register for the Year 1780 listed two hundred and sixty-seven physicians and surgeons practicing outwith Edinburgh.⁸⁵ They were scattered over the country, not only in the cities and large towns such as Edinburgh, Glasgow, or Stirling, but small towns like Arbroath and Cupar, and even the islands of Skye, Orkney and Shetland, although they were by no means

evenly distributed; Fife boasted nine inoculators, while Kirkcudbright and Wigtownshire, which were large and reasonably well populated, had none.

Monro's data shows that both physicians and surgeons were performing inoculation. Monro received reports of inoculation from fifty two surgeons and thirty five physicians. Some patients were cared for by a physician and a surgeon; Monro noted that patients supervised by Dr. Alexander Stevenson, Glasgow's senior physician, were listed under the name of the attending surgeon. However, Monro also recorded inoculations performed by surgeons in small villages, like Carpow or Brioch. Such communities were unlikely to have more than one practitioner, and the local surgeon probably undertook all aspects of inoculation.(see Appendix III)

Although a significant number of practitioners were inoculating, only a very small proportion of the total population had undergone the procedure. Wealthy families were the most frequent clients; Monro reported that in Scotland children of "the greater number of the gentry, and most of the medical gentlemen" were inoculated.⁸⁶ Generally speaking, the common people had a strong religious prejudice against the practice, and had refused to adopt it.⁸⁷ The popularity of inoculation varied over the country. A large number of inoculations had been performed in Dumfriesshire, where the practice had been in use since the 1730s. It was most popular in the vicinity of Edinburgh and Glasgow. Over the country as a whole, Monro recorded a total of five thousand, five hundred and fifty four inoculations. Although some practitioners probably estimated the number of inoculations - several claimed to have carried out suspiciously round numbers - there are no obvious grounds to question this figure as a reasonable estimate. This number of

inoculations does not at first appear significant, given a total population of around one million, three hundred thousand. However, it must be remembered that most of those inoculated were children. The inoculation of adults was rare; John Walker made a particular note of thirty four adults among the two hundred and seven persons inoculated in Glenelg in the 1760s. If the number of inoculations recorded by Monro is compared to the population of children under the age of ten, then the proportion inoculated is as high as one in fifty six, or roughly two per cent.⁸⁸ In Dumfriesshire, Dumbartonshire, and Lanarkshire, where the procedure was most popular, as many as one in fifteen or one in twenty children had been inoculated. (see appendices IV and V)

It is impossible to make any such estimates about the frequency of inoculation over Britain as a whole. However, the large numbers of inoculations performed during the epidemics of the 1750s suggest that the practice had a good deal of popular support; but such pieces of evidence have to be set against John Andrews observation that inoculation was 'still sparingly practiced' in 1765. There was a degree of religious prejudice against inoculation south of the border as well as in Scotland. In 1747, Charles Perry noted

[inoculation] is made a Party Affair; I mean of a religious Nature: for the Dissenters, and others who go under the Denomination and Distinction of Whigs, almost universally approve it, and many of them practice it; - whereas those who are on the other Side of the Question (I mean in religious Matters) generally disapprove and condemn it.⁸⁹

However, this seems to have worn off fairly quickly. In 1753, a Chelmsford surgeon claimed that religious objections to inoculation were "almost given up...except amongst a few bigots".⁹⁰

The texts on smallpox and inoculation, studied in these two chapters show that medical thought and practice were going through fundamental change in the first half of the eighteenth century. Physicians were moving away from a reliance on classical theories, and developed new ideas of disease. As a result, they moved away from highly individualised therapeutics to more routine methods. In the treatment of smallpox, theories of contagion which described smallpox as a specific disease, producing the same disease process in all patients, allowed practitioners to construct more uniform methods of treatment; either by grouping together cases of smallpox by type, or by setting out a sequence of therapy according to the different stages of the disease. In inoculation, physicians also developed methods of preparation, grouping patients according to their constitution.

The inoculation texts reveal that the creation of ever more standardised methods brought about a dilemma for the physicians. By continuing to insist on the need for individualised preparation, the physicians were able to defend their traditional position as the elite of the medical profession. However, although the public appeared to support the physicians, they increasingly turned to surgeons for inoculation. The surgeons exploited the expanding market, offering cheap inoculation to the middling classes. They also won over at least part of the physicians' traditional patient pool amongst the upper classes, so that by 1760 the old monopolies of practice had largely disappeared.

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90. Gentleman's Magazine 23, (1753) 217.

Chapter Four: The Triumph of Inoculation, 1767

The gradual routinisation of inoculation practice, in which practitioners moved from dealing with each case as a unique phenomenon to the creation of different 'methods' of inoculation adapted to types of constitutions, reached its apogee in the 1760s when a new system of inoculation burst onto the medical scene, the so-called "Suttonian method", named after its creator Robert Sutton. At first glance, the method seems unremarkable, but it aroused a degree of passionate controversy which equalled that surrounding the introduction of inoculation some forty years earlier. On closer examination, it becomes clear that it was not so much the techniques that were unusual, but the object and manner in which they were applied. The Suttonian method was the first explicitly disease-centred, rather than patient-centred inoculation technique; patients received the same preparation and treatment, regardless of constitution or circumstances. Instead, drugs were given according to the progress of the disease, and to suppress, not forward the natural disease process. It proved highly successful, not only in producing a suitably mild form of smallpox, but also in reducing the costs of the procedure. Accordingly, it attracted a new and much larger audience for inoculation.

The method challenged the physicians status as authorities on inoculation, and reaction was swift. The old professional elite sought to discredit the method, branding its practitioners with the stigma of quackery. Unfortunately its success could not be denied; ultimately physicians rehabilitated the method, embracing its techniques, while rejecting the

Suttonian style of practice. They insisted on the need to adjust its application to the needs of the individual patient. Although the physicians had enjoyed some measure of support in their attempts to regain their monopoly of inoculation in the 1750s, by 1767 the public's patience had worn thin. The Suttons' and their followers dominated the market for inoculation, while the physicians continued to inoculate among the highest ranks of society.

The development of 'new' medicine, which moved away from seeing illness as a unique configuration of patient plus disease, to one in which the disease was the main object of attention is usually associated with clinical practice in institutions, staffed by a new elite group of practitioners. In the case of inoculation, however, a disease-centred method, which ignored the patients constitution and environment, was developed by a family of rank and file provincial practitioners and used to build up an extensive private practice. The method was developed by Robert Sutton, a surgeon in the small town of Kenton, Suffolk, in southern England. As he kept the method secret, the details of how he created the new technique are unclear. He was supposedly inspired to study the practice when his eldest son was inoculated and suffered a severe case of smallpox. Sutton made the first trial of a new technique some time in 1755 and by 1757, taking advantage of the growing demand for inoculation, he opened two inoculation houses. Around December 1761, he modified his method and in 1762 began to advertise his new, safer technique, which included inoculation 'without incision' and with new medicines which rendered the smallpox very mild.¹

Robert Sutton never revealed the details of his method, and the descriptions which were finally published in the mid 1760s, from patients who had undergone the operation, or from observing practitioners, included some minor improvements made by Daniel Sutton, his second son. The techniques used were not revolutionary, but were clearly linked to the pattern of developments in the 1750s. The Suttons were much less careful in choosing only those patients suitable for inoculation, accepting everyone who presented themselves.² The preparative diet was similar to that prescribed by inoculators in the 1750s. Patients were forbidden to drink alcohol or eat any meat, cheese or butter, and were allowed only skimmed milk. They kept to a diet of fruits, vegetables and puddings washed down with water, teas and gruels.³ Following the trend to shorter and shorter periods of preparation, this diet was used for only fourteen days, and was later shortened to eight. The Suttons did not bleed or vomit their patients, but gave them a course of purges. Prior to the operation, patients took three doses of a powder at night, followed by a dose of purging salt the next morning. Although the exact composition of this medicine was unknown, some patients were salivated by it, indicating that it contained mercury, a drug routinely used in preparation.⁴

Unusually, patients were also given medicines between inoculation and the onset of the smallpox symptoms. They took pills containing mercury and antimony which purged and induced sweating. Observers differed as to when these were given; George Baker reported that the pills were given every other night following the operation, but other accounts suggested that they were given from the fifth day.⁵ Although this practice was not advocated in any of the works on inoculation published in the 1750s, it was similar to

methods of inoculation in use in America where most or all of the medicines were given after inoculation.⁶ The Suttonian preparation was perhaps rather stricter than usual methods. In a rare eyewitness account of its use, Bamber Gascoyne described the effect of a diet consisting of "asparagus, spinnage, cucumbers and puddings with plumbs, pruens or gooseberries..cold water and cyder..and sometimes milk and water." His son was like "a gun barrel", while his servant looked "as if he had slip'd the chains from a gibbet".⁷

The inoculation technique itself was also somewhat unusual. Inoculators in the 1750s had begun to make smaller and more superficial incisions and to abandon complex dressings. The Suttons took this further. Instead of using a small piece of thread or lint impregnated with matter, Suttonian inoculators used a lancet dipped in the fluid taken from a pock to make a slight puncture. Afterward, no dressings or plasters were applied.⁸ Later they used the clear liquid which issued from an inoculation site as the infecting matter. Although this was unusual, it was not without precedent; Thomas Frewen had suggested that the fluid from the incision could be used to inoculate in 1749, but it was certainly not used routinely.⁹

The Suttons also took the trend to uniform methods of treatment to new heights. In the 1750s, physicians had emphasised the influence of the patients age, sex, constitution and habit on the severity of the resulting smallpox. They therefore developed different methods of preparation, varying the degree and length of preparation and number, type and dosage of medicines, according to different constitutions. Surgeons and apothecaries seem to have advocated a simpler approach, and James Burges described only one form of preparation. The Suttons also prescribed a standardised

preparation. All patients followed the same diet for the same length of time, and received the same drugs. The only concession was to reduce the dosage of drugs given to children, to prescribe milder purges, and to allow patients of a weak constitution to halve the doses of purging powders, although they still had to take the same total amount.¹⁰

Instead of varying the preparation according to the patients' circumstances, the Suttons sought to ensure mild smallpox by prescribing drugs during the smallpox episode, adjusted to the progress of the disease. Earlier inoculators gave no particular treatment after the operation - it was hoped that the preparation would have put the body fluids into a proper state to receive the disease. Any therapy given was to treat particular severe symptoms. Otherwise, the treatment was passive - practitioners tried to remove anything which hindered or disrupted the natural disease process. Patients were expected to suffer all the symptoms of the natural disease with some fever and a fairly extensive rash. The Suttonian method was designed to actively suppress the symptoms as much as possible, by cooling the patient and making him or her sweat. The number of doses were adjusted, not according to the patient's constitution, or the symptoms as in the 1750s, but to the appearance of the incision site. The Suttons claimed that that degree of redness or efflorescence around the inoculation site was an infallible guide to the case; the larger the efflorescence, the milder the smallpox. After inoculation all signs of the wound disappeared until the third day when the area around the puncture became red and inflamed. The extent of this red area was used by the inoculator to predict the severity of the subsequent smallpox; the smaller the efflorescence, the greater the number of pocks

which would appear. Patients were advised to stay out of bed as much as possible, and to walk in the open air, even in cold weather. They were also encouraged to drink cold water or a "punch" with nitre or vitriolic acid and flavoured with lemon juice. If the inoculator feared a bad case of smallpox, patients were given larger doses of the punch. If very severe, they received additional purging pills.¹¹ This technique was reported to allow the inoculator to control the number of pocks; it could make pocks disappear, and, one writer claimed, allowed Daniel Sutton to make them appear in patterns.¹²

Although the latter story has to be taken with a pinch of salt, there was no doubt that the method appeared to be immensely successful, producing much milder smallpox than earlier methods. In 1766, a letter to the Gentleman's Magazine described the successful inoculation of one hundred and fifty six persons by Daniel Sutton in Ewell, Surrey with remarkably mild symptoms.¹³ The Suttons' patients were reportedly "subject to very slight Symptoms, sensible of very little Sickness: nor do what few Eruptions they have, ever leave any Scars or Pits behind them".¹⁴ Those with twenty or thirty pocks had a bad case, many had no pocks at all, but even though they had "no other Mark of the *Small Pox* but the Incision, [they] are secure as those who have it more plentifully".¹⁵ It was claimed that of twenty thousand persons inoculated by the Suttonian method only two or three had died, and those had disobeyed their practitioners' instructions.¹⁶

The Suttonian method created a revolution in inoculation practice. In 1772, George Baker wrote; "inoculation, which was heretofore in a manner confined to people of superior ranks, is now practiced even in the meanest

cottages and is almost universally received in every corner of the kingdom".¹⁷ William Woodville, writing in the 1790s described it as "a new era in the history of inoculation".¹⁸ James Moore, writing twenty years later admitted that Daniel Sutton had "propagated inoculation more in half a dozen years, than both the faculties of Medicine and Surgery, with the aid of the Church, and the example of the Court, had been able to do in half a century."¹⁹ The Suttonian method produced such an explosion in the use of inoculation partly through its safety, but mainly because it was the first method of inoculation adapted to mass practice. Because all patients went through the same regimen of diet and drugs, practitioners no longer had to spend time taking a careful medical history, assessing the patients' constitution, and setting out an individualised plan of preparation. Very few visits were made. Benjamin Chandler reported that they visited their patients on the fifth and seventh days after inoculation, then daily until the eruption was complete.²⁰ When Daniel Sutton inoculated the Gascoyne boys he made only a handful of visits. He inspected his prospective patients from a distance of twenty yards, fearing he might infect them. It is not clear if he attended them during their preparation, or simply left the drugs with instructions. He then visited to inoculate, and on the third and tenth days to bring further medicines. He also called on the sixth day, when one of the boys was particularly unwell.²¹

With so little attendance given, the Suttons were able to deal with large numbers of patients at one time, and they built up a huge business in inoculation. Unlike most practitioners, who performed the occasional inoculation, or those who ran an inoculation house as an adjunct to their

general practice, the Suttons specialised in inoculation. By September 1758 Robert Sutton had three 'spacious' inoculation houses; one for inoculation, one for nursing, and one for airing patients. Information on the service was available through agents spread over the county, and neighbouring Norfolk and Essex.

The family business was expanded in late 1762, when Robert Sutton began inoculating in three more inoculation houses in Norfolk. Thereafter houses were set up by Sutton and his six sons covering all of the south-east of England. His eldest son, Robert, joined his father in practice in 1762, then established his own inoculation house just outside Bury St Edmunds in Suffolk. The following year, his second son, Daniel, set up two houses in the small town of Ingatestone in Essex. This operation shows how carefully the houses were sited. Although Ingatestone was a small town, it was an established stopping place on the road out of London, from which he hoped to draw clients. Three years later Daniel moved to London with his brother William, setting up houses in Kensington and Brentford. Two younger sons, Joseph practiced in Oxford and Thomas on the Isle of Wight. The business spread further afield when James Sutton set up in Yorkshire, and two sons-in-law practiced in Birmingham and the Hague.²²

Besides this extensive family practice, the method was also franchised out to other practitioners. For between fifty and one hundred pounds, or a share of the profits from the venture, practitioners were privy to the secrets of the method and became the Suttons' partners. By 1768, fifty three Suttonian inoculators were practicing throughout the British Isles from Devon in the south to Lancashire in the north, in Dublin, Glamorgan, and as far afield as

Jamaica and Virginia. In addition, many 'imposters' had copied the method after its publication.²³ It rapidly became the mostly widely used method of inoculation: a correspondent to the Gentleman's Magazine in 1767 noted that the method "is already adopted by most practitioners, at least in my neighbourhood".²⁴

This huge practice was supported by a large patient pool. Because little attendance was required, the Suttons were able to offer inoculation at low prices, thereby making the procedure available to a much wider audience. The Suttons served all classes. They inoculated wealthy patients in their own homes, or like Gascoyne's sons, boarded out at nearby houses. The costs of inoculation in their houses, which included bed, board, medicines and attendance was varied with the service offered. In 1757, Robert Sutton charged seven guineas per month, or five for 'farmers' who received a rather plainer diet. As the preparation period was reduced, costs fell accordingly; by 1761, Robert Sutton lowered his top price to five guineas. In 1765, Daniel Sutton was operating three houses, where inoculation cost six, four and three guineas. By the late 1770s, the lowest price was down to two guineas. Conditions for those at the lower end of the market were hardly palatial. Patients reportedly had to share a bed and slept eight to a room. For those unable to afford the inoculation houses, the Suttons travelled to country towns on market days to inoculate, the patients returning home with medicines and instructions. Their fees were, of course, much lower than those for "inpatients". Robert Sutton Sr., originally offered inoculation for 10/6, but his son soon halved it to 5/3. This in turn was undercut by practitioners imitating the Suttons method.²⁵

The Sutton family inoculated huge numbers of patients; Robert Sutton Sr. was reported to have performed two hundred inoculations in 1760 and double that number two years later. Robert Sutton Jr. inoculated over five hundred persons in the first six months of 1762.²⁶ However Daniel's practice soon dwarfed all these figures. He was reported to have performed 1,629 inoculations in 1764, 4,347 in 1765, and 7,618 in 1766, although a few writers questioned the accuracy of these figures.²⁷ This brought him a substantial income. He earned over £6,000 in 1765 alone, and was reported to have made between forty and fifty thousand pounds over three years. Even if, as seems likely, the latter is an exaggeration, Sutton was clearly earning as much as a prominent physician. He used his money to purchase a measure of respectability. At the height of his fame Sutton employed Robert Houlton as chaplain at his inoculation house at Ingatestone at the generous salary of two hundred guineas per annum. He bought land and houses, married a wealthy widow and entered his son at Cambridge University. He received a coat of arms, with the emblem of Love holding a torch and the motto 'Tuto, Celeriter, et Jucunde' ('Safely, quickly, and pleasantly'). His portrait, painted in the 1760s, shows a handsome and well to do young man in wig and embroidered coat.²⁸

The tremendous publicity surrounding the Suttonian method brought it to the attention of all practitioners. Most physicians were not happy with what they learned, and 1766 and 1767 saw an intense debate over the merits and safety of the method, in which an elite group of physicians, representing the conservative bastions of the profession, the court and the Royal College of Physicians came to terms with the new method.

In part, the physicians must have feared for their own practice. At the height of their fame, the Sutton family inoculated members of the gentry.²⁹ On at least one occasion, Daniel Sutton inoculated a lady of "considerable fortune and distinction", and stayed in her home during the whole procedure.³⁰ Other members of the family also moved in exalted circles; Sutton's brother in law travelled to Prussia to set up practice there at the invitation of the nobility, while another member of the family inoculated the French nobility.³¹

However, the Suttons also posed a more general threat, to the physicians' position as the ultimate authorities on inoculation. Up to 1767, virtually all the improvements to inoculation techniques had come from the physicians, and, as the debate of the 1750s showed, they were still recognised as the group best qualified to perform inoculation. The Suttons seemed to show that rank and file practitioners were capable of devising methods of inoculation better than any created by their medical peers.

They enjoyed tremendous popular support. The Sutton family, particularly Daniel Sutton, were portrayed as popular heroes, who had improved inoculation, and broken the greedy physicians' monopoly, thus making the operation available to the mass of ordinary people. The physicians were accused of insisting on an unnecessarily complex individualised method in order to preserve their lucrative monopoly. Their opposition to the method was founded in self-interest - and the fear that they would lose their lucrative inoculation practice. Daniel Sutton's chaplain, Robert Houlton complained that the physicians had opened "sluices of malice, envy and detraction...against the new mode of inoculation. Old

practitioners were alarmed for their practice; and many who had considerable incomes from attending patients under the natural Small-pox, afraid they should have nothing to do".³² Although Houlton obviously had his employer's interests at heart, his views were shared by a correspondent to the Gentleman's Magazine who suggested that "one half of these gentlemen are envious of Mr. Sutton's reputation as an inoculator; and the other half afraid of his running away with their practice."³³ Even the periodical press supported the Suttons; attacks on the practice were swiftly answered and pamphlets opposed to the Suttonian method received unfavourable reviews in the Gentleman's Magazine, Critical Review and Monthly Review.³⁴

An anonymous author, who styled himself 'Hostis Monopolarum' - an opponent of monopoly - claimed that the physicians only became interested in the Suttonian method because of the large fees involved. He provided a description of the method so that his readers might "safely become Operator to yourself, your Family, or whoever you please".³⁵ Popular health texts embraced the Suttonian method as early as 1767; when the Family Guide to health appeared with an appendix, summarising the salient points of the Suttons' method.³⁶

The physicians tried to reassert their position in two ways. A few physicians launched out and out attacks on the Suttonian method itself, claiming that it did not convey smallpox or convey immunity. Given the enormous success of the method, this was perhaps unwise. Other physicians took a different tack; they sought to discredit the Suttons and their followers, but adopted their techniques, insisting again on the need to adjust therapy to the individual constitution.

The most vituperative attacks on the Suttonian method came from William Bromfeild, surgeon to the Princess of Wales, and William Langton, a physician. They articulated a theoretical critique of the Suttonian method. Bromfeild feared that the Suttonian method did not produce a proper case of smallpox. During the course of the disease, smallpox matter present in the body from birth was separated out and expelled, thereby leaving the patient immune to further attacks of smallpox. Cooling remedies were beneficial in reducing the inflammation, and thereby slowing the eruption and ensuring a mild case of smallpox. However, there were dangers if this remedy was taken to extremes. To confer immunity, inoculation had to "raise such a fever by the insertion of variolous matter, as may bring about that depuration of the blood, which nature seems to intend by the disease in the natural way."³⁷ The Suttonian method, with its strict, low diet, mercurial purges before inoculation, and particularly its insistence that patients should walk around outside, even in cold weather, suppressed the natural disease process. Cool remedies could be safely applied during the eruption, but thereafter, patients should keep warm in bed, to ensure that the matter was not sent back to the centre of the body and to encourage the maturation of the pocks.³⁸

William Langton was even more critical of the method. Under the Suttonian method, the inoculated smallpox was totally different from the natural disease - the "contagion and symptoms [were] essentially different".³⁹ They were so different that it could not be the same disease, and consequently, inoculated patients were not protected against further attacks of smallpox. This was partly due to the inoculation technique. Matter taken from the inoculation site was not infectious. The infectious matter was expelled only

during and after the fever. Fluid taken from the incision before the eruptive fever did not contain the smallpox virus but was only a "contagious caustic water".⁴⁰ Even if the matter did contain the smallpox virus, the use of a small superficial incision meant that the matter was left in the skin, and did not penetrate into the body. As a result the procedure produced only a local reaction, which at first glance seemed similar to that of a successful inoculation, but did not produce the generalised disease necessary to ensure immunity. Even if, by some miracle, the inoculation did succeed, the use of mercury and antimony and the 'low' state of the patient's blood produced by the strict preparative diet suppressed the action of the smallpox virus and disrupted the disease course. During the slight fever, only a "partial ferment" took place, in which part of the smallpox matter was separated from the blood, forming a few pocks. These did not contain either the "Quantity or Quality of matter required to ensure immunity."⁴¹ Langton concluded that the apparent success of the cold regimen proved that the Suttons' patients were not suffering from smallpox. In the natural disease, exposure to cold air closed the pores, driving the matter back into the body; if cold air was of benefit in inoculation, then the patient was not suffering from smallpox.⁴²

Both Bromfeild and Langton warned that the use of a cold regimen stored up trouble for the future. By suppressing the disease, Suttonian inoculators "wantonly risked [sic] the future health of those who had put themselves under their care".⁴³ Enough smallpox matter was left in the blood to leave the patients susceptible to further attacks of the disease. If not expelled in a genuine case of smallpox, the matter was forced out by the body in a second eruption of pocks or in persistent and troublesome abscesses.

Patients also had their constitutions permanently damaged by the severe diet and mercurial medicines.⁴⁴

Langton and Bromfeild were in the minority, however. Most practitioners were willing to admit that the Suttonian method had proved successful. Giles Watts, a physician, even produced a pamphlet attacking Langton and Bromfeild. He was "sorry to see" the Suttonian method "condemned in so positive and absolute a manner".⁴⁵ Under the method, patients did suffer a true case of smallpox, which left them immune, with no side effects. Thomas Dimsdale wrote: "experience, however, and instances of so many thousands succeeding by this method, without any considerable bad effects from it...are irresistible arguments for its support and justification, and the best proof of its utility and safety."⁴⁶ When asked to comment, even the royal physicians and surgeons grudgingly admitted "Messers Sutton and others have communicated the smallpox with very great success, and have thrown some new lights upon the subject of inoculation".⁴⁷ Nevertheless, they could not resist the opportunity to point out that inoculation already had a good success rate even before the advent of the Suttons' practice.

Other critics of the new inoculation joined Langton and Bromfield in attacking the Suttons' qualifications. They contrasted their own learning with that of the Suttons, both implicitly and explicitly. Thomas Tomlinson revived the use of Latin, once the language of the learned physician, in his pamphlet of 1767.⁴⁸

Most practitioners reminded their readers of the Suttons' lack of education. Thomas Dimsdale noted that the success of the new method was all the more surprising since "the operators were chiefly such...as could lay

but little claim to medical erudition".⁴⁹ Without explicitly mentioning the Suttons, George Baker remarked how many improvements, including the introduction of inoculation itself had come about through "ignorance and Barbarism".⁵⁰ The slight was not lost on his readers; J. Z. Holwell, a member of the Royal Society took him to task for the remark. "However just *in general* this learned Gentleman's remark may be, he will, as to his *particular reference*, be surprised to find that nearly the same salutary method...has the sanction of remotest antiquity."⁵¹

Some writers were more generous, and granted the Sutton family some recognition. Thomas Dimsdale criticised practitioners who attempted to steal the Suttons' method; the family deserved some pecuniary reward for their efforts. However, the physicians were unrestrained in their criticisms of the Suttons' followers. The success of the method had led to completely unqualified 'low mechanics' abandoning their proper spheres to set up as inoculators; Baker cited the case of a friend's livery servant who had left his post and set up as an inoculator. Watson criticised these 'illiberal' practitioners, but was careful to exclude the Sutton family from the charge.⁵²

The physicians sought to discredit the Suttons as quacks and their method as 'quackery'. Such accusations were frequent in the eighteenth century, when licensing of practitioners is best described as loose and there was no hard and fast line between 'regular' practitioners who possessed some sort of formal medical training and a varied assortment of irregulars.⁵³ The behaviour of the Suttons left them open to such attacks. Their use of particular medicines, the composition of which was kept secret was one of the classical features of the quack, and physicians frequently referred to the

Suttons medicines as 'nostrums', with the implication that they did not have the effects claimed for them.⁵⁴ Benjamin Chandler pointed out "What have all the boasted nostrums, arcanums, catholicons and specifics ever proved at last to be?".⁵⁵

The Suttons' specialist practice also led to accusations of quackery. All forms of specialist practice - like bone-setting, cutting bladder stones or cataracts - whether or not they were part of the regular practitioners duties - smacked of irregular practice. One anonymous author described Daniel Sutton "strutting like a frothy montebank".⁵⁶ Specialists did not apply the same breadth of knowledge of the whole body, or adhere to professional codes. Instead, they acted according to their commercial interests.⁵⁷ If the Suttons had the public interest at heart they would have published the method and made it more widely available, not tried to retain the secret and maximise their own private gain.⁵⁸ The connection with trade was reflected in William Bromfeild's description of Daniel Sutton as "the most celebrated of the wholesale dealers [in inoculation]".⁵⁹ However, although their specialist practice might be like that of the irregulars, the Suttons were trained as regular practitioners, with at least some of the sons, including Daniel completing the usual apprenticeship training. The strongest accusations were therefore reserved for the Suttons' followers, and particularly Robert Houlton, Daniel Sutton's chaplain who was pilloried as a quack.⁶⁰

Like the supposed 'cures' of other charlatans, critics charged, the Suttonian method succeeded only by playing on the fears of a gullible audience. Its inoculators made wild promises - smallpox with little

discomfort and no disfigurement - prompting comparisons with a contemporary stock market scandal.

I could not help recollecting, that I had heard formerly of a system in stock-jobbing; which has now for a considerable time been named the South-sea bubble. Whether our posterity, of a few years or months to come, will, or will not hiss, with imprecations at a S-TT-N-IAN bubble, is a moot point which I shall not presume to determine.⁶¹

It was not entirely the fault of the practitioners. Patients had lost their fear of inoculation, and now approached the operation with "as little concern [as] formerly to be electrified."⁶² As a result, they had become careless in the choice of practitioners, assuming anyone who offered to inoculate them could do so safely and successfully. Giles Watts complained "most [patients] seem to think every illiterate practitioner of this art properly qualified to carry them with safety through the distemper".⁶³ William Bromfeild was scandalised; "the credulity of my countrymen has been justly the object of ridicule to foreigners" but "as to have given credit to a man who should assert that he would give Men a disease which should not produce one single symptom that could characterise it from the usual state of health" was beyond belief.⁶⁴

While the physicians dismissed the Suttons, their highly successful techniques came in for more serious scrutiny. The physicians attempted to analyse the techniques and identify the factors which made the Suttonian method so successful. However, most of the techniques were already commonly in use. The preparative diet was similar to that described in the original accounts of inoculation by Emanuel Timoni and Jacob Pylarini, or the treatment of natural smallpox prescribed by the Arabic physician Rhazes.⁶⁵ The Suttons' medicines were subjected to chemical analysis by Thomas Ruston in 1767, which confirmed earlier conjectures that the active

ingredients were mercury and antimony.⁶⁶ Writers pointed out that these drugs were commonly used in the treatment of natural and inoculated smallpox, and had been recommended by such medical luminaries as Hermann Boerhaave, Richard Mead, John Andrew, John Huxham and Benjamin Gale.⁶⁷ Some writers questioned whether mercury had any particularly beneficial effect in smallpox. George Baker claimed that mercury had no effect on the variolous virus, but acted simply as a purge. William Watson, physician to the London Foundling Hospital conducted a clinical trial of Sutton's method. He prepared a group of children with mercurial and non-mercurial purges and counted the number of pocks to judge the severity of the resulting smallpox. He concluded that the use of mercury had little effect on the result.⁶⁸

Having dismissed the main features of the Suttons' procedure as routinely used, physicians were left struggling to account for the success of the method. Not surprisingly, they failed to reach a consensus. Giles Watts suggested that the very strict preparation with no animal foods and the course of 'brisk' purges ensured mild smallpox. Thomas Glass argued that it was the practice of making the patients sweat, using the acid punch and pills after inoculation which carried off part of the smallpox matter usually found in the pocks. Benjamin Chandler criticised Glass, and claimed that Sutton did not make his patients sweat. He concluded it must be the practice of inoculating with unconcocted matter.⁶⁹

A number of writers pointed to the use of a cool regimen as the reason for the Suttons' success.⁷⁰ However, although the Suttons had popularised the method, the physicians were unwilling to give the family any credit for

originating it. George Baker, physician to Princess Caroline, nine times president of the the Royal College of Physicians, and a Fellow of the Royal Society made a detailed study of its use. This cool technique aroused the greatest controversy. As William Langton had claimed, established theory predicted that cooling the patient would halt the perspiration, and hinder the expulsion of smallpox matter or drive it back into the centre of the body, causing a secondary fever. "I need not say how much it has been thought right," Thomas Dimsdale wrote

to forward by every gentle means the efforts of nature in producing an eruption: and on the contrary how dangerous to check it, either by cold air, cold drink or any considerable evacuations; or that the use of warm dilutents therefore, and the lying in bed have been generally approved and recommended for the purpose. But when a practice so foreign to this, and almost totally different is inculcated, it is no wonder if men's minds are alarmed.⁷¹

George Baker argued that just such a cool method had been prescribed by Thomas Sydenham, one of the eighteenth century's highest medical authorities. In his Inquiry, Baker traced Sydenham's ideas through successive editions of his works to prove that he became increasingly favourable to such a regimen. Initially Sydenham had simply stopped applying hot remedies, but by the end of his lifetime he recommended taking patients out of bed and encouraging them to walk around outside. This idea was so radical that practitioners had been afraid to put it into practice, and had gone back to a more 'temperate' regimen which was then in general use. Sutton's method therefore simply fulfilled Sydenham's original intentions.⁷² Its effect was to reduce down the rate at which the smallpox matter was formed in the body,

slowing the eruption, producing a more thorough separation, and milder smallpox.⁷³

If the physicians were unsure as to why the Suttons had enjoyed such great success, they were unanimous as to how the practice could be further improved. By abandoning the Suttonian standardised preparation and applying the physicians' traditional skills and carefully adjust the drugs and diet according to the patients' constitution, patients would enjoy mild smallpox which guarantee that they were left immune to further attack. Physicians stressed the dangers in not adapting the method to the individual patient. Smallpox, whether inoculated or natural was still a potentially fatal disease. George Baker warned; "Even the Small-Pox communicated by inoculation, which in general are so mild, that they rather appear another species of disease,...are capable of becoming most malignant and fatal under improper management."⁷⁴ Giles Watts, who had defended the Suttons method against the attacks of his fellow physicians still ridiculed those practitioners who approached inoculation

As if it required nothing more, than to order a total abstinence from all animal food, spirituous and fermented liquors, and from spices, to give a few doses of mercurial or antimonial physick, and to make a puncture or two with a lancet infected with variolous matter in the arm, to be able to inoculate with safety to the life and future health of a patient.⁷⁵

Prescribing the same preparation for all patients, ignoring their constitution was simply 'absurd'.⁷⁶ The main factor influencing the severity of the smallpox, as confirmed by William Watson's clinical experiments, was not the drugs or the inoculation technique, but patients' constitution. Given such variation between individuals,

no general plan of preparation can possibly be laid down; as three doses of physic may be too for some weak children, and six may be too few for adults that are robust and corpulent; the judgment of the Inoculator should always determine as to the necessity of evacuations, and abstinence or occasionally to invigorate by a more nutrient diet.⁷⁷

For the majority of patients, the Suttonian regimen was far too rigorous. The strict diet and strong purges used to prepare patients for smallpox weakened their vitality, making them less able to withstand the smallpox episode. Such stringent therapy could induce fatal convulsions in small children. George Baker concluded

Such...are the effects,...whenever the disease is prescribed to and not the patient...The same method and medicines cannot rationally be opposed to firmness, and to relaxation; to superfluity, and to defect; to a man of strong, elastic fibres, and dense blood, and to a weak, hysterical, cachectic woman.⁷⁸

If the Suttonian method were allowed to continue, it would be to the detriment of all, leading to the abandonment of inoculation entirely.

Bromfeild wrote "I am afraid that Inoculation, tho' hitherto a great blessing to our island, will in a very Short time be brought into disgrace, by the licentiousness of some of the present itinerant practitioners".⁷⁹ Thomas Ruston gloomily echoed his fears. "it were greatly to be wished that this practice, was rescued out of the hands of quacks, before many of *these* [fatalities] occur, to sink into ignominy and contempt, one of the greatest and perhaps the most useful discovery ever made in physic."⁸⁰

The physicians set out to perform just such a rescue, recapturing inoculation from the Suttons and their followers, reasserting their superior knowledge and therefore greater abilities in performing inoculation. As Watts pointed out that "if such illiterate practitioners, as these, to whose care

it were almost a piece of madness to trust even a brute that is sick, are able to practice with tolerable success" then "those, who have a good knowledge of medicine [were able] to practice it with infinitely more safety to their patients".⁸¹

The physicians warned that inoculation was not a simple operation; Thomas Ruston warned that "no branch of physic requires a more extensive knowledge of the animal oeconomy, of different constitutions, of the nature of disease, and of medicine in general."⁸² Knowledge of the effect of the constitution was central to successful inoculation, with all aspects of preparation carefully tailored to the circumstances of each patient.

A number of writers published modified forms of the Suttonian method, arguing for the need for careful adjustment of their standardised treatments, but the first and by far the most influential was that of Thomas Dimsdale, published in The Present Method of Inoculating for the Small Pox. The inoculation described in his Present Method was taken almost directly from that of the Suttons' but Dimsdale rejected a standardised preparation for a more individualised regimen, like that advocated in the 1750s. Dimsdale employed the Suttonian inoculation technique using fluid matter and a superficial puncture and the cold regimen with a very strict preparative diet. Like earlier authors, Dimsdale began with a warning that practitioners should not inoculate every patient who presented themselves; not all patients were suitable candidates for inoculation. Practitioners should select only those fit to undergo the operation, according to their present circumstances and the patients' medical history. However, he admitted

In respect to constitution, greater liberties may be taken than have heretofore been judged admissible: persons afflicted with various chronic complaints, of scrofulous, scorbutic and arthritic habits; persons of unwieldy corpulency, and of intemperate and irregular lives, have all passed through this disease, with as much ease and safely as the most temperate, healthy, and regular.⁸³

The patient's particular circumstances also influenced the choice of preparation. Dimsdale warned

the particular state of health of every person entering upon the preparatory course, should be enquired into and considered. Inattention to this has, I am satisfied, done great mischief, and particularly the indiscreet use of mercurials, whereby a salivation has been raised, to the risque [sic] of impairing good constitutions, and the ruin of such as were previously weak and infirm. The distinctions and treatment necessary, will be obvious to those who are acquainted with the animal oeconomy and medical practice.⁸⁴

Preparation should be prescribed with a view "to reduce the patient if in high health, to a low and more secure state; to strengthen the constitution, if too low; to correct what appears vitiated"⁸⁵. Most patients could follow a preparative regimen similar to that prescribed by Sutton; a low, vegetable-based diet, with three doses of a purging powder and pills composed of calomel, tartar emetic and crabs claws. In a number of cases, particularly children, preparation could safely be dispensed with altogether. Patients who were weak - particularly children, women and old people - required courses of smaller 'alterative' doses of mercurials, and a strengthening diet with wine and broths. The same regimen should not necessarily be used throughout the inoculation process. If the disease did not progress, especially during the maturation of the pocks, the cold regimen should be abandoned and strengthening food and cordials given to help the progress of the eruption.⁸⁶

After the operation, Dimsdale, like Sutton, prescribed therapy according to the progress of the case, using the appearance of the incision site as a guide.⁸⁷ He gave a description of the appearance of the incision on each day. However, in case his readers might be tempted to place the same trust in a visible symptom as the Suttonian inoculators, he warned that the incision was not an infallible indication. "By attending to the progress of infection" he wrote "we may be able to prognosticate, with some degree of certainty, the event of the distemper in general. Particular incidents will ever happen, but not sufficient to destroy the propriety of general rules."⁸⁸

Dimsdale also extended the cold regimen to the treatment of cases of natural smallpox. He found that even when called in while the disease was well advanced, purges, cool air and cold drinks helped to slow the eruption and reduced the number and size of the pocks.⁸⁹ Other practitioners also reported the good effects of such therapy.⁹⁰

Even though Dimsdale added little or nothing to the Suttonian techniques, he succeeded in recapturing the position of chief authority on inoculation from Daniel Sutton, because his professional qualifications were much more orthodox. Both Dimsdale and Sutton started as rank and file provincial practitioners, training as apprentices to a local surgeons. But whereas Sutton developed a curious status, as a very wealthy, widely admired but not quite respectable practitioner, Dimsdale made himself a member of the established professional elite. Dimsdale admittedly had the advantage of a more socially acceptable background - his family owned property in Essex and he inherited his cousin's estate. In keeping with his rise in social status, Dimsdale acquired an M.D. degree from Aberdeen University in 1761, a

qualification which required no study whatsoever. He adopted the Suttonian method in his own practice in 1765, and two years later, published the Present Method. His crowning glory came in 1768, when he received an invitation to inoculate Catherine the Great (ironically Sutton had first been offered the job, but demanded a fee of £4,000 which even the Empress regarded as too high.) He returned from Russia as "the Honourable Baron Thomas Dimsdale, first Physician and actual Counsellor of State to her Imperial Majesty the Empress of all the Russias" - a title which he always included on the title pages of his subsequent works - with a fee of £10,000 and a pension of £500. He set up an inoculation house in London, and for ten years sat as Member of Parliament for Hereford.⁹¹

Dimsdale's work was preferred to that of Sutton by most practitioners. William Bromfeild praised Dimsdale's treatise and in 1771, John Blake published a method, based on that of Dimsdale rather than Sutton.⁹² At the Edinburgh Medical School in the early 1770s, John Gregory described the Suttonian method, but expressed some reservations over the family's medical skills. William Cullen also taught a method of inoculation based on Dimsdale's work.⁹³

Thereafter the cold method was generally accepted. William Buchan, writer of the late eighteenth century's most influential popular health text, Domestic Medicine, reflected the physicians concern over the method. In the first edition of 1769, Buchan described the Suttonian method, but expressed strong reservations about the cold regimen. "Some celebrated inoculators order their patients to walk about all the while they are under the disease...We should think it advisable however to keep within doors,..as cold

air is apt to check the perspiration, and to prevent the pox from rising".⁹⁴ By 1779, Buchan had got over his fears and recommended the cold method enthusiastically.⁹⁵

Although the modified Suttonian technique was popular amongst practitioners, medical acceptance of the Sutton methods came in for strong criticism. One commentator remarked: "It is true they acknowledge, because all Britain knows it, that Mr. Sutton has improved the practice of inoculation. But then, they insinuate that having learnt a part of Mr. Sutton's improvements, they ought to be esteemed better inoculators than their masters."⁹⁶ A satirical pamphlet The Tryal of Mr. Daniel Sutton, for the High Crime of preserving the lives of His Majesty's Liege Subjects, published at the height of the debate in 1767, portrayed Daniel Sutton charged by the College of Physicians for successfully practicing inoculation using unknown methods and without "the fear of the College in your heart".⁹⁷ In a skillful piece of writing, the anonymous author drew on the physicians' published analyses to prove that Sutton's techniques were not unusual, and had him acquitted.

Even so, the modified method found favour amongst the physicians' wealthy clients. Thomas Dimsdale enjoyed a reputation as the most fashionable inoculator. Richard Hoare, a wealthy banker employed Sutton for his own inoculation in the 1760s but his children were inoculated by Dimsdale.⁹⁸ It is not clear if this was because of Dimsdale's social status (Jewson has suggested that patients employed practitioners of roughly equal social standing) or his method of practice. The gentry may well have preferred the individual attention, with the right to negotiate over their own treatment

and to exercise patronage, regardless of the much larger fees demanded, than follow Sutton's simple, but strict instructions.

As a result, the achievement of the Sutton family was eclipsed. In 1796, when Daniel Sutton finally published an account of the procedure he complained that "it has been circulated, That I am not the person who introduced the New System of Inoculation...and that for many years I had quitted my profession, and was long since dead."⁹⁹

Although the Suttonian/Dimsdalian method remained the backbone of inoculation technique for the rest of the century, physicians were responsible for one further 'improvement'. Ironically, they abandoned the use of preparation before inoculation, although they continued to advocate the use of diet and medicines after the operation, in the week or so before the onset of symptoms. The idea had been first mooted in the 1760s, during the debate over the Suttonian method, by an Italian physician Antonio Gatti. He contented that patients required no preparation for inoculation, and that they need only be in good health.¹⁰⁰ Not surprisingly, the idea received short shrift. George Baker warned that a state of 'high health' was in fact very close to a disease state, and apparently healthy patients still needed to employ a practitioner to ensure that they would pass safely through the procedure.¹⁰¹ However, in 1781, when Dimsdale reviewed the method set out in the Present Method, he reported that he no longer prepared patients before inoculation, but gave two or three mercurial purges after the operation.¹⁰²

The Suttonian method holds a unique place in the history of inoculation. Not only was it the first disease-centred method adapted to the inoculation of very large numbers, but it effectively ended the debate over the

best method of practice, a debate which had gone on since the 1720s. In 1791, Alexander Aberdour was still recommending the method of inoculation developed by Sutton.¹⁰³ As late as 1806, George Lipscomb advocated the Suttonian method of inoculation as a safe alternative to the new practice of vaccination.¹⁰⁴

The Suttonian method finally established inoculation as a cheap, safe form of practice, available not only to the rich but to the mass of ordinary people. Although the number of inoculations had risen steadily through the 1750s, the Suttonian method caused an explosion in the popularity of the practice. With it came the end of the physicians leadership in inoculation practice. Although they managed to retain a small group of wealthy clients, who were willing to pay for individualised attention, the Suttons had stolen the intellectual march on the physicians. Before 1766, the physicians had dominated the debates over the best method of practice, and public opinion had regarded them as superior practitioners. After 1767, although the physicians themselves clearly believed that they were 'improving' on the Sutton's practice, the public perceived them as engaged in a face-saving exercise, with the attacks on the Suttons as an attempt to salvage some professional credibility and preserve their status.

The debate of 1767 was, however, a culmination. It was the point at which compromises between the physicians' desire to formulate new forms of medical knowledge, and the fact that their professional status was linked to older forms of theory and practice became almost untenable. Physicians were forced to compromise again in order to reconcile the newest and most

successful form of inoculation practice, with their increasingly archaic body of theory and norms of practice. By this time, the strategy had worn thin.

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Chapter Five: Private Virtue and Public Vice: the institutionalised provision of Inoculation

Many historians have identified institutions - particularly hospitals and medical schools - as crucial to the development of a new, disease-centred medicine. However, such institutions played relatively little part in the development of inoculation technique. The institutionalised provision of inoculation as a form of public health care was made possible by the Suttonian method, which had been worked out in private practice. Its standardised techniques greatly reduced the costs of the operation and its highly successful record increased public confidence in the procedure, opening the way for institutions to control smallpox through large scale inoculation.

The provision of inoculation has a curious history. In some ways it is typical of developing public health care in the middle and late eighteenth century. Although unusual in that it was a form of preventative medicine, public inoculation was rationalised by the same mercantilist and cameralist ideas, and was provided through the same type of institutions as measures to restore the sick poor to health. As with other forms of health care, its greatest champions were drawn from a small circle of practitioners, mainly dissenters, educated at Edinburgh, who built their careers through the new institutions.

However, there was one central problem in moving from inoculation as a means of protecting individuals against smallpox to a public health measure, designed to control smallpox epidemics; inoculated patients were capable of spreading smallpox. To ensure the success of public inoculation,

institutions had to both provide inoculation and try to control the spread of infection. For this reason, public inoculation flourished first and best within the old administrative structure of the Poor Law, where it fitted neatly into earlier measures for controlling epidemics. These 'general inoculations' proved highly successful, both in decreasing sporadic outbreaks of smallpox, and in reducing the frequency of epidemics. However, general inoculation was used in only limited circumstances; in large villages and small towns in the prosperous South of England.

In sharp contrast, attempts to provide free inoculation in cities aroused controversy. General hospitals were unable to provide inoculation for fear of spreading smallpox, and the London Smallpox Hospital was unable to deal with large numbers of patients. The first inoculation dispensary faced strong criticism from a conservative faction within the medical profession. This debate was the last struggle of the old elite to assert their leadership over inoculation; and though it succeeded in discrediting the London dispensary, the new generation of practitioners associated with it became the acknowledged authorities on the practice. This opposition did not stop provincial practitioners from mounting schemes for free inoculation in other cities. It is not clear how effective these general inoculations were; much smaller numbers were inoculated in the cities than in villages, and the general inoculations had no long term impact on smallpox incidence, but they did halt individual outbreaks.

At first glance, it seems curious that the first successful public provision of preventative medicine was made through the system of parish poor relief. Although, in terms of the number of patients, the Poor Law was

the most important source of health care in the eighteenth century, it provided basic care through local practitioners, and it was not famed for its innovative approach. General inoculations organised by the poor relief have been described by Peter Razzell and J. R. Smith, but they have not explained why this new practice was so successful within a very old fashioned institution. However, local poor law administrators had a keen interest in controlling smallpox, and developed a set of techniques to limit the spread of infection long before the 1760s. Once inoculation became so cheap that parishes could afford to inoculate large numbers of the poor, general inoculation was fitted into these existing measures.

The welfare apparatus established by the Elizabethan Poor Law was a piecemeal system; based around the church and organised within each parish. Medical care was only part of its responsibilities. By law, all parishes had to support "the lame, the impotent, the old, the blind, and such other among them being poor and not able to work".¹ Funds were raised through local taxes or rates on property and by tithes. They were distributed by the clergy and parish officers - churchwardens, constables and overseers of the poor - who were elected from the community. Poor relief was not just available to 'paupers'. Provided they fulfilled residence requirements and could demonstrate need, any parishoner could claim relief. Contemporary writers estimated that as much as a quarter of the population of England qualified for aid. Many recipients were families normally able to support themselves but who had no savings to pay for medicines or surgeons' bills when they fell ill.

Poor law medical care was provided by local surgeons or apothecaries. Most parishes contracted with a practitioner to care for all the sick poor. If required, the parish also supplied a nurse, usually a widow who was herself dependent on the Poor Law. In addition, patients received small sums of money for food and fuel, making up for lost wages.²

Smallpox presented a major problem to the administrators of poor relief, absorbing between one fifth and one tenth of all funds. Smallpox patients were particularly expensive to treat. Nurses demanded higher rates of pay for dealing with such an unpleasant and dangerous disease and patients required care for several weeks. According to a letter published in the Gentleman's Magazine in 1788, each smallpox patient cost the parish two guineas, excluding medical attendance. Essex parish records show that this had risen to £5 by the end of the century.³ In addition, if any patients died, they had to be buried at parish expense. Consequently, severe epidemics stretched the resources of poor relief to breaking point - in 1758, Castle Colme in Wiltshire paid out £141 for the care of smallpox victims - and many parishes were forced to set up special funds to cover the high costs.⁴

This inspired the parish authorities to develop a series of measures to limit its spread and reduce the number of victims. To discourage travellers suffering from smallpox from entering in a parish, they were refused poor relief. Instead, the costs of their care devolved on those individuals who took them in.⁵ All smallpox patients were isolated, either in their own homes or in the parish 'pest-house'. A few parishes had pest houses dating back to the plague years of the 1660s, but most were established in the second half of the eighteenth century specifically to accommodate smallpox patients.⁶ Most pest

houses stood outside main centres of population and away from busy roads, to the north or north east of towns so that the infection was carried away by the prevailing south west winds. They were simply furnished and could accommodate only a handful of people. During epidemics such accommodation often proved insufficient, and other - sometimes unlikely - buildings were pressed into service; in 1743, patients were isolated in Banbury Castle, while those of a neighbouring parish were cared for in a barn.⁷ The second building was often used as an 'airing house' where patients convalesced for a period to ensure that they were no longer infectious.⁸ Only the poor could be compelled to enter pest houses, but at least one parish suggested that all victims should voluntarily enter "for the good of the town", and offered to pay their expenses. However, it seems unlikely that respectable citizens would be willing to cohabit with local 'paupers'.⁹

Pest houses were expensive to maintain, but were reckoned to be cheap in the long run. The parish of Colne Engaine was described as "lately been at great expense in not having a proper place for the reception of Persons afflicted with the Small Pox".¹⁰ Some parishes rented a suitable building for a few guineas a year; others raised large sums to build a pest house. The small parish of Woodford spent a total of £60 on building and extending their pest house, while Chelmsford spent £120 building its pest house. Such large expenditures could not come out of the usual Poor Law funds; some parishes imposed special local taxes, others were lucky enough to have local landowners contribute to the costs.¹¹

Parish authorities were not the only group concerned to control outbreaks of smallpox. Ordinary townspeople also had an interest in limiting

the effects of the disease. In small towns, smallpox epidemics severely disrupted the local economy; traders were too frightened to visit, both for their own personal safety and because it was still commonly believed that the infection could be transferred on clothes or in bundles of goods. Annual fairs and weekly markets were closed or deserted for long periods. In Dartford, Kent "the country people became so alarmed that the market was nearly deserted, and did not recover for some years".¹² Travelling courts were also cancelled, justiciary and defendants alike refusing to visit infected towns.¹³

Inhabitants joined with the parish authorities in advertising the end of epidemics and the resumption of trade in local newspapers. The 'Leading Inhabitants' of Rayleigh, Essex, advertised in the Ipswich Journal

Upon a strict Enquiry in this Town, NOT ONE Person is afflicted with the SMALL POX; nor is it in but one House in the Parish, and that a Mile from the Town... N.B. On MONDAY the 30th Day of May, being the Fair-Day, will be a large Shew [sic] of Horses and Colts.¹⁴

Parish officers and medical men were prominent amongst the signatories to such advertisements. The curate, churchwardens, overseers, four medical men and thirteen citizens of Braintree reported that the town was free of smallpox.¹⁵ They were also quick to dismiss any false rumours of smallpox; the citizens of Romford claimed that stories that smallpox was present in their town were false and certified that smallpox "is intirley [sic] ceased in the said Town".¹⁶

Before the advent of general inoculation, the practice was regarded as a potential source of smallpox infection. Inoculation houses were a focus for mistrust. Thomas Frewen complained that the local inhabitants cut through the fields to avoid passing his inoculation house, with the result that he was

prosecuted by the landowner. Several practitioners were forced to give up inoculation after their neighbours threatened to - or succeeded in - pulling down their inoculation houses.¹⁷

Town authorities took less summary means to regulate the use of inoculation. They restricted the procedure to a period before and during smallpox epidemics. As early as 1723, just two years after the introduction of inoculation to Britain, an Oxford practitioner explained;

The Mayor and Corporation of this City have not executed their Authority to suppress the Practice of Inoculation upon any Dislike or bad Success of the Practice it self, but because the smallpox has been declining ever since August and Scarce to be found at present in the whole Place, it was thought proper to discountenance the Operation at this Juncture, lest it should revive the Distemper amongst us.¹⁸

The ban on inoculation was enforced by prosecution In Colchester, the leading citizen and traders warned that

The practice of bringing People out of the Country into this Town to be inoculated for the SMALL-POX being very prejudicial to the Town in many Respects, but especially to the Trade thereof, and as by this Practice the Distemper may be continued longer in the Town than it otherwise...would, it is thought proper that this publick Notice should be given, that they are determined to prosecute any Person or Persons whomsoever, that shall hereafter bring into this Town, or who shall receive into their Houses in the Town, as Lodgers, any Person for that Purpose, with the utmost severity that the Law will permit.¹⁹

Similarly, the inhabitants of Maldon announced that they were "*determined to prosecute*" any person undergoing inoculation in the town.²⁰

Practitioners were prosecuted for causing a "public nuisance" by allowing their patients to wander about while infectious.²¹ In Colchester, following an outbreak of smallpox lasting several months, the town's practitioners announced that they had "unanimously agreed not to Inoculate

any Persons from this Time 'till October next".²² Inoculators were careful to stress the care they took to ensure their patients could not be a source of infection. Chelmsford's surgeons and apothecaries advertised that "convenient Houses are already hired above a Mile from Chelmsford, for [inoculation]; and that they will inoculate no Person or Persons for the future, unless they consent to be removed to such House or Houses."²³

The degree of hostility shown to inoculators is well illustrated by Daniel Sutton's experience. Late in 1763, Sutton leased two houses on the main road to Ingatestone, Essex, about a mile outside the village. When local people learned that he intended to practice inoculation, Sutton was threatened with prosecution. In the local newspaper, the "principal Inhabitants" complained that the position of the houses meant that infection would inevitably reach the village and they expressed their intention of "give[ing] all the Opposition thereto that the Law will enable them to do; as infecting a Town of so much Traffick will be a Detriment to the Public, and may be easily proved a Nuisance"²⁴ No legal proceedings were taken at the time, since Sutton had failed to attract any patients. His business built up slowly during the spring of 1764 and that summer, when smallpox broke out in the nearby town of Chelmsford, Sutton was charged with causing a public nuisance. At the summer assizes, he appeared before magistrates but was acquitted on the ground that there was no proof that his inoculation practice, rather than that of local apothecaries, was the source of infection. However, Sutton was publicly admonished for bringing inoculated patients into the town.²⁵

After 1766, parish and civic authorities added general inoculation - the coordinated inoculation of a large section of the population to halt a smallpox epidemic - to these measures. General inoculation developed out of established patterns of practice; writers frequently noted that inoculation was rarely practiced when smallpox was not present, but as soon as the disease appeared, large numbers of people were inoculated. During the nationwide smallpox epidemic of the early 1750s, inoculation was extensively practiced in a number of towns. Over four hundred people were inoculated in Salisbury, one hundred and twenty seven in Bradford-upon-Avon, and over three hundred in Blandford and in Wootton-under-Edge, in Gloucestershire.²⁶ The parish authorities began to provide inoculation for the poor in the late 1750s; the parish of Beaminster paid for the inoculation of twenty seven poor people in 1758.²⁷ The first recorded co-ordinated inoculation to control a smallpox epidemic was in Blandford in 1766 when one hundred and fifty inhabitants were inoculated. In the same year, Daniel Sutton performed successful and well publicised general inoculations in Maldon, in Ewell, Surrey and in Maidstone in Kent.²⁸

General inoculations required the close cooperation of parish authorities and townspeople. The decision to organise a general inoculation was made collectively. At Blandford, when the town was hit by a severe epidemic, a public meeting was called on the 13th of April and the general inoculation was mounted three days later.²⁹ The degree of public interest aroused by general inoculation was demonstrated at Lewes in 1794. The parish constables called public meetings - one of which filled the town hall - on two successive days to decide on measures to deal with an outbreak of

smallpox. When it became clear that the outbreak was serious, a third meeting was called to decide whether or not a general inoculation should be organised. At first the medical men of the town advised against it, but after inspecting the infected houses, they changed their minds and the constables called a fourth public meeting at which it was decided to conduct a general inoculation.³⁰

Once the decision had been taken, the parish authorities acted rapidly to discover who required inoculation, and who could not afford the operation. In some places, the parish officers undertook door-to-door surveys of the population; others simply announced the intention of holding a general inoculation, and relied on the poor to come forward. The poor formed a large proportion of those inoculated; of more than four hundred inoculated in Maldon, only seventy 'tradespeople and gentry' were able to pay for the operation. This was unusual, however; more often the parish paid for less than half of those inoculated.³¹

Inoculation was usually excluded in contracts with practitioners for care of the parish poor. Instead, parish officers invited bids for the inoculation of all their poor inhabitants. Charges varied according to the numbers involved - the greater the number, the lower the cost. Practitioners usually charged per head, or occasionally quoted a flat sum. Competition was fierce. In Glynde, a local practitioner offered to inoculate all the poor of the parish for twenty guineas, in a deliberate attempt to "spoil" the trade of one of the Suttons.³² Over the century, prices fell. In the 1760s, 5/- per head was the average charge, but by the 1780s prices had fallen to as little as 1/- per head.³³ The same practitioners usually offered private patients a cheap rate; in

Brighton a group of local practitioners agreed to inoculate the poor and servants at 2/6 per head, and all others at 7/6.³⁴ Of course, parishes usually accepted the lowest tender, though some practitioners complained that this encouraged unskilled inoculators. Thomas Dimsdale cited the case of a blacksmith who offered to inoculate for 2/6 per head, and to pay the burial expenses of any who died as a result.³⁵

Ironically, given the opposition to Daniel Sutton's practice, it was his technique - as we have seen - which made general inoculations possible. Patients underwent little or no preparation, although some prepared themselves by following a low diet. They gathered at some central point, where they were inoculated and given purging medicines. A few days after the operation, the patients were examined to check that the inoculation had taken. If the inoculator suspected a patient might have a bad case of smallpox, additional medicines were prescribed. If only a small number required inoculation, the poor were authorised to go to certain practitioners, who would then inoculate them. Thomas Dimsdale suggested that patients should be monitored daily between the seventh and eleventh day to ensure no serious symptoms appeared. However, in the struggle to reduce prices, many practitioners provided little attendance after the actual operation.³⁶

General inoculation was integrated with older means of controlling smallpox. In at least some parishes, great care was taken that inoculation should not spread smallpox to susceptible persons. Dimsdale suggested that anyone who was unwilling to be inoculated should be boarded out of town; more often, they were left to 'take their chance'.³⁷ On at least one occasion, at

Glynde, the inoculated patients were isolated in a stable.³⁸ After general inoculations, the practice was usually banned for some time.

The general inoculation at Lewes in 1794 shows how neatly it fitted into earlier measures. When smallpox was reported to have appeared in one house, the parish took steps to try to stem the outbreak. The parish constables had a fence erected round the infected house, and placed a watch to stop the family from coming into contact with any neighbours. When this failed to stop the spread of the disease, the whole street was barricaded off. At a public meeting, it was decided to mount a general inoculation, and after a week, a third public meeting was held, at which practitioners were told to stop inoculating.³⁹

General inoculations became increasingly popular over the last three decades of the eighteenth century, however. After Sutton's pioneering efforts in 1766, several other practitioners took up the practice. Thomas Dimsdale performed a mass inoculation in his native town of Hertford in 1767, while Thomas Frewen inoculated over three hundred persons in Rye, Sussex.⁴⁰ Thereafter, the practice lapsed for the remainder of the decade - reflecting a decline in the number of smallpox epidemics - but revived in the early 1770s and flourished throughout the rest of the century. (See Appendix VI)

General inoculations enjoyed popular support. In theory at least, the inhabitants volunteered for inoculation, although as anyone who has ever lived in a small community knows, there would probably have been a good deal of informal pressure to participate. The total numbers inoculated were impressive; in Dursley, Hungerford and Southampton well over a thousand inhabitants were inoculated, while over one thousand, eight hundred people

were inoculated in Brighton in 1786, and a massive two thousand, eight hundred and ninety inhabitants of Lewes in 1794.⁴¹ These numbers include a surprisingly high proportion of adults. In Blandford in 1766 more than half of those inoculated were over the age of ten and some were over forty.⁴² In the general inoculation in Southampton, in 1774, almost half were over the age of six. The proportion of children usually increased in subsequent general inoculations, with the exception of Southampton. Perhaps because it was a port and had a highly transient population, adults continued to make up almost half of those inoculated the second and third mass inoculations in 1778 and 1783.⁴³

Although the total numbers inoculated are in themselves impressive, the proportion of the population they represent is astonishing. In Maldon in 1766 Sutton inoculated between one third and one quarter of all townspeople, while a mass inoculation in Newport in 1772, protected almost half of the inhabitants.⁴⁴ In Lewes, over 59% of the population were inoculated in 1794 and a general inoculation in Dursley in 1801 involved 62% of the population.⁴⁵

Not surprisingly, general inoculations were highly effective in bringing smallpox epidemics to an end; in Maldon, in 1766, there were only ten cases of smallpox left within three weeks of the mass inoculation. In the long term, general inoculations reduced the frequency of epidemics. After three general inoculations in Hertford,

we have heard nothing of Small Pox, and I verily believe, that within these ten years not six persons have died in Hertford of this disease; whereas before the practice was so generally adopted, the Small Pox has frequently been epidemic and destroyed a great number of the

inhabitants, besides injuring the market and trade of the town for a considerable time.⁴⁶

The long term effects on the number of smallpox deaths are harder to judge, since the number of deaths fluctuated, but a decline in mortality in Maidstone, Kent, for example, from over 12% to less than 2% coincides with the use of general inoculation.⁴⁷

Despite their success, general inoculations were not used throughout Britain, but were confined to the south and south east of England. (See Appendix VI) Thomas Dimsdale observed that general inoculations were most common in the counties around London, and Bedfordshire, Buckinghamshire, Hertfordshire and Cambridgeshire.⁴⁸ His remarks are borne out by modern studies; Smith has shown that mass inoculations were relatively common in Essex, and E. G. Thomas noted their use in Oxfordshire and Berkshire. Peter Razzell has recorded mass inoculation in thirteen counties. (See Appendix VII) Although there have been no comprehensive surveys, it seems that general inoculations were rarely mounted outside this area. The Gentleman's Magazine, which carried many reports of, and references to, general inoculation made no mention of any carried out in the midlands, the north of England or Wales, and John Sinclair's Statistical Account records only a few large scale inoculations in Scotland.⁴⁹

In part, this reflected patterns of settlement. In the south of England, the population was gathered in villages; in the north, and in Scotland, it was more widely spread. Rural parishes took few measures against smallpox - only a handful had pest houses.⁵⁰ General inoculations were possible in rural areas, but, as the records of two such programmes conducted in northern Scotland show, they took a great deal of time and effort. In 1775, Andrew

Murray began to conduct a general inoculation around Crieff. He inoculated patients up to four miles from Crieff, and paid each at least two visits. He took ten months, from February to November, to inoculate less than two hundred children. (See Appendix VIII) John McLagan, a surgeon in Taymouth had an even more arduous task in inoculating one hundred and thirty children in 1780. He reported "I had a vast deal of Fatigue for many weeks attending such a number and some of them being 20 miles distant from the other. He was disappointed to receive only £15 for inoculating over a hundred and thirty children - roughly two shillings per head. This sum, he complained, would not cover his travelling expenses or the medicines used.⁵¹

The costs of general inoculation may also have limited its use to the prosperous south of England. Dimsdale complained of "obstinacy of some parishes, and the parsimony of others" that they would not "advance the small sum that would be necessary".⁵² However, inoculations were expensive undertakings. The parish of Rye paid over £40 for a general inoculation in 1767, that of Bocking paid £17.10, and East Ham £14. Such large sums could not come out of normal Poor Law funds. The port of Southampton mounted a public subscription to raise the £63 required for an inoculation in 1774, and the parish of Northwold borrowed £22 to cover similar costs.⁵³ A few parishes were helped by wealthy landowners; the parish of Beccles received £15 towards the costs of an inoculation, while a 'gentleman' paid for the inoculation of eighty six poor from Kings Nympton. In 1781 the Earl of Kinnoul paid for the inoculation of eighty people in Leeds.⁵⁴ In addition to the cost of inoculation, parishes still had to support

any poor who succumbed to smallpox. In Brighton, the parish paid £151 for the inoculation of over five hundred poor inhabitants and a further £140 for nursing and burying twenty five victims of natural smallpox.⁵⁵ For many parishes the two bills were probably beyond their means, and they simply took their chances with the natural disease.

General inoculation was obviously not practical in large towns or cities, though as the experience of Southampton and Brighton shows, they could be successfully organised in towns with a population of seven or eight thousand. Instead inoculation, like other forms of health care was provided through the new institutions which sprang up in the late eighteenth century. These had little experience in dealing with smallpox. Hospitals were reluctant to take smallpox patients for fear of the spread of infection; the one specialist hospital which did provide inoculation and isolated its patients could deal with only a tiny proportion of those who wished to be inoculated. Dispensaries - which offered inoculation on an out-patient basis - were able to provide inoculation at low cost, but had no control over the movements of their patients and were attacked for spreading the disease. Provincial dispensaries therefore began to offer free inoculation for only limited periods, or to mount elaborate schemes to control the spread of infection. Neither proved very successful.

Under the pressure of rapid urban growth in the second half of the eighteenth century, the parish-based system of poor relief broke down. Its responsibilities were taken over by institutions; workhouses, foundling hospitals and by hospitals and dispensaries. The hospital movement began in the early eighteenth century. In London alone five new hospitals were established between 1720 and 1745. Hospitals were founded rather later in the

provinces. The first was created in Edinburgh in 1729, and the second in Winchester in 1736. By the end of the century there were over thirty hospitals in large towns all over the country.⁵⁶ However, hospitals proved inadequate to deal with the numbers of sick poor in the cities; they offered mainly in-patient care, and necessarily their facilities were limited and relatively expensive. From 1770, dispensaries were set up, particularly in the north. They offered out patient care; patients attended the institution to be diagnosed and given treatment or medicines free of charge, but they were nursed by their family in their own homes. Some dispensaries also sent out practitioners to visit the sick in their own homes.⁵⁷ In addition to the hospitals and dispensaries for general care, there were a vast array of specialist institutions for patients with venereal disease, for the insane, and for pregnant women. There was even a society for the revival of drowned persons and another providing trusses to the ruptured poor.⁵⁸

The new institutions were funded through private philanthropy. The eighteenth century saw almost a mania for charitable giving, financed by the economic boom of the late seventeenth century, and inspired by a new religious freedom; non-conformists, particularly Quakers took a leading role in the hospital movement.⁵⁹ Hospitals and dispensaries drew their income mainly from public subscription; patrons gave a certain sum of money or stock every year. In addition, collections were taken at special church services, the sale of published sermons, extolling the virtues of the particular charity, dinners, balls, musical evenings and plays also produced an income.

Subscribers were induced to part with their money by appealing to what what now may seem like a curious mixture of piety and personal

interest, but which was, at the time entirely typical. The institutions fulfilled a religious duty to help one's fellow man. However, the sermons and appeals also pointed out that the strength of the nation was related to the size of its population; the larger the number of productive workers, the wealthier the country would become. Medical charities which saved lives and restored workers to health served everyone's interest. For the subscribers there were also more immediate rewards: the prestige of displaying their wealth and virtue, and social contact with the patrons of the institution, usually members of the nobility.⁶⁰

In return for their contribution, subscribers were given a voice in the running of the institution. They controlled access to the institution; their subscription gave them the power to distribute letters of recommendation without which patients were not ordinarily admitted. The number of patients any one subscriber could have under treatment increased with the size of their donation. Subscribers also voted on policy decisions at yearly or half yearly meetings.

However, the institutions were dominated by its medical staff. The day to day running of the institution largely rested with its committee, made up of office bearers elected from the subscribers and the medical staff. Staff could also admit patients without recommendation, if they felt immediate treatment was required. The institutions played an important role in the changing structure of the medical profession. For practitioners, such posts in hospitals or dispensaries provided a small income, was a source of prestige and were a means of demonstrating their skills, helping to bring in private patients. Such posts were also a means of attracting fee-paying pupils and

apprentices, who wanted access to hospital wards in order to observe cases. Increasingly, institutions could also provide a means for advancing medical knowledge, although in the eighteenth century this bore fruit mainly in the form of records of the institution and studies of the patterns of disease.⁶¹

Compared to the parish poor law authorities, the new hospitals and dispensaries did little to control smallpox. Eighteenth century hospitals were small and ill-equipped to deal with a large influx of patients during epidemics. Indeed, most specifically excluded patients suffering from infectious diseases, including smallpox for fear that the disease would spread amongst the other patients.⁶² For the same reason, they did not provide inoculation.

The only hospital which routinely offered free inoculation was the London Smallpox Hospital. It was founded in 1746 by a group of philanthropists to care for poor people suffering from smallpox and, after 1751, it also inoculated the poor free of charge. However, because patients were isolated throughout the process it could deal with very few patients. The names of those who wished to be inoculated and had a letter of recommendation from a subscriber were placed on a waiting list, which at one point contained over a hundred names. The hospital took in a new group of patients every six weeks or so. Very strict precautions were taken to ensure that patients did not catch the infection, or spread it outside the hospital which faced repeated complaints from neighbours that it was a source of infection.⁶³ When a place was available, the patients entered the hospital at Islington where they were prepared for two weeks. They were then transferred to the hospital at Cold Bath Fields for the actual inoculation and

were nursed there. After four weeks, their clothes - which were taken away and fumigated with sulphur - were returned and the patients were released.⁶⁴

The process was gradually streamlined over the century. After 1767, patients went through the whole procedure at the hospital at St. Pancras. By 1776, preparation had been abandoned, and the length of stay was cut from six to three weeks.⁶⁵ Despite this, and the expansion of the facilities, the Smallpox Hospital could deal with only a tiny proportion of those requiring inoculation. The hospital began to offer free inoculation in the early 1750s, inoculating less than two hundred people a year. This rose to over three hundred by 1760.⁶⁶ There are no patient records from the Smallpox Hospital, but it seems that many of the favoured few who managed to enter the hospital were the domestic servants of its wealthy subscribers. Servants were usually excluded from hospitals; however, the Smallpox Hospital announced it served "distressed housekeepers, labourers, servants and strangers".⁶⁷ Servants suffering from smallpox presented a particularly difficult problem; in one of the sermons to raise funds for the hospital, Samuel Squire complained "to keep a servant in such a Condition is,...exceedingly inconvenient: To thrust them out of Doors under such Circumstances always inhuman, commonly fatal."⁶⁸ The difficulty of acquiring inoculated servants was a common complaint, and it seems likely that subscribers took advantage of the hospitals facilities to isolate their sick servants and to have them inoculated.⁶⁹

Since hospitals failed to tackle the problem of providing inoculation to the poor, practitioners tried to fill the gap by establishing dispensaries. Because dispensaries offered outpatient care, with patients nursed in their

own homes, they were able to deal with much larger numbers, at much lower cost. However, as the founders of the first dispensary were to discover, they also faced the problem that their patients passed freely through the streets, possibly spreading smallpox.

In London, the first attempt to set up a dispensary was made by the indefatigable Daniel Sutton. In 1770, he placed an advertisement in Lloyd's Newspaper describing a plan to inoculate the poor in their homes. A subscription would be used to set up houses all over London, staffed by a surgeon or apothecary, trained in the Suttonian method. Anyone holding a letter of recommendation from a subscriber could attend the house, be given preparatory medicines, then return after an appropriate interval to be inoculated. Nothing further was heard of the scheme, which presumably never got off the ground.⁷⁰

The second, more successful proposal was made in 1776, by the 'Society for the Inoculation of the Poor at their own Homes'. The Society was led by John Coakley Lettsom, James Sims and John Watkinson who had seven years earlier established London's first dispensary in Aldersgate Street.⁷¹ They were part of a distinct circle of practitioners closely associated with institutions to provide free medical care to the poor. They were dissenters, graduates of the Scottish or Continental medical schools, and therefore excluded from the Royal College of Physicians of London. Instead, they belonged to new societies, such as the Medical Society of London, and published in the new medical journals.⁷² They had a distinctive form of medical knowledge. At Edinburgh, they had learned William Cullen's views that fevers were spread mainly by contagion, not by a 'constitution' of the air. Once graduated, many

became interested in disease as a collective phenomenon; collecting and publishing data on disease incidence in cities.⁷³ They were prominent in the movement for hospitals to have 'fever wards' where patients could be isolated.⁷⁴

These practitioners were drawn to the institutions for a number of reasons. The dissenters saw the care of the poor as a religious duty. They, more than any other group stressed that the poor were not vicious or lazy but suffered through misfortunes not of their own making and were in genuine need of help.⁷⁵ John Coakley Lettsom wrote "The poor are a large, as well as a useful part of the community; they supply both the necessary and ornamental articles of life; they have, therefore, a just claim to the protection of the rich."⁷⁶

The Society proposed to make inoculation much more widely available through an Inoculation Dispensary. Funds were raised through subscription. Like the Smallpox Hospital, the Society called on subscribers' humanitarian and mercantilist instincts, emphasising how inoculation protected citizens from the dreadful ravages of smallpox, saving lives, and thus increasing the labour force which was the basis of the nation's wealth and strength.⁷⁷ The Dispensary for General Inoculation, which opened in 1777, was organised along the same lines as other dispensaries. Subscribers had the right to recommend patients, who were inoculated at the dispensary by two surgeons and an apothecary. The dispensary also had one honorary physician and two consulting physicians, who were called in to difficult cases.⁷⁸ Very little is known of the patients, but it seems that the Dispensary admitted very young

children; its physicians hoped to inoculate children before teething, or after they had cut their first set of teeth.⁷⁹

The dispensary aimed to deal with as many patients as possible. Because it treated only outpatients, it could inoculate much larger numbers of patients than the Smallpox Hospital - and do so at much lower cost. Patients still had to obtain a subscriber's recommendation. However, at the General Dispensary, Lettsom and his supporters had deliberately set the level of subscription very low to encourage ordinary tradesmen to subscribe, thus making it easier for working people to obtain letters of recommendation.⁸⁰ The same minimum donation of one guinea was instituted at the Inoculation Dispensary, in sharp contrast to the five guineas demanded by the Smallpox Hospital. Not that the Inoculation Dispensary was adverse to upper class subscribers - it announced that 'the nobility, Members of Parliament, ladies, and Directors' were able to vote by proxy at annual meetings.⁸¹

Even before the Dispensary opened, it ran into strong opposition from members of the medical profession, who claimed that its patients spread smallpox. The opposition was led by Thomas Dimsdale, who had ten years earlier defended the physicians' role in inoculation in the debate over the Suttonian method. Dimsdale was a friend of John Fothergill, a close friend of Lettsom, and as one of the foremost authorities on inoculation, was a logical candidate for the post of honorary physician to the Inoculation Dispensary. However, he refused the post, having grave doubts about the plan, which he expressed in his Thoughts on General and Partial Inoculations of 1776 and later expanded in a series of pamphlets. Dimsdale emphasised that he was not opposed to inoculation of the poor *per se*. "I am an advocate for inoculation;"

he proclaimed, "and wish the design of extending the benefit to the poor may be so conducted, as to afford the enemies as few opportunities of objecting to it on any solid ground as possible".⁸² He then proceeded to become the chief enemy to public inoculation in cities. Dimsdale approved of general inoculation in towns, and had carried out several general inoculations in his native Hereford. In relatively small communities the spread of infection was easily controlled. All susceptible persons would be inoculated at one time, and any who did not wish to undergo the operation were warned to avoid the area.

Partial inoculation, where only a few members of the community were inoculated was a dangerous practice. In cities inoculation was dangerous both to the individual and to the public in general. In the cold, damp housing and the foul air in which the poor of London were forced to live, and without proper food or nursing, inoculation was liable to produce a severe, if not fatal, case of smallpox.⁸³ More importantly, it was impossible to control the spread of infection. Under the Suttonian method, inoculated patients had to be exposed to cool air, by walking around outside. Dimsdale alleged that anyone and anything they came into contact with acted as carriers of infection - tradesmen, laundrywomen, even carriages would disseminate smallpox.⁸⁴

Dimsdale feared that the Dispensary's activities would actually lead to an increase in the number of cases of smallpox, and thus the number of deaths. To support his point, Dimsdale reiterated an earlier criticism made in the 1760s by French practitioners that the number of smallpox deaths recorded in the London bills of mortality had risen since the introduction of inoculation in 1721.⁸⁵ In particular, Dimsdale pointed to a sharp rise in the

number of smallpox deaths in the last four years, when inoculation was most popular.

The Dispensary staff led the defence of the institution, arguing that inoculation posed no threat either to those inoculated, or to the general public. The procedure was entirely safe. For all that their opponents spoke "as if the harmless inoculator was brandishing the tomahawk and scalping-knife, instead of the lancet".⁸⁶ The men and women inoculated by the dispensary lived in conditions, which, though not luxurious, were not as dreadful as Dimsdale imagined. Ordinary working people had enough to eat, enjoyed reasonable accommodation, and were able to survive the loss of wages while mothers stayed at home to nurse sick children. The quality of the air in the back streets was poor, but had little effect on people who were hardened to living in such surroundings.⁸⁷ In any case, as an 'Uninterested Spectator' to the debate pointed out, if such conditions produced malignant inoculated smallpox, they would also cause severe natural smallpox. It was therefore better to inoculate the poor than to leave them to take their chance with the natural disease.⁸⁸

On the question of whether smallpox was spread by contact with inoculated patients, the Dispensary's supporters had to admit that it was, technically, possible. However, they argued that in practice it rarely happened; Lettsom claimed that there had been no instances of a dispensary patient infecting anyone.⁸⁹ Others argued that inoculated patients had a mild disease, with few pocks and were therefore less likely to spread the disease than those suffering from natural smallpox. For the same reason, they were less able to spread the infection through the atmosphere. A large number of inoculated

patients produced less effluvia than an equal number suffering from the natural disease, allowing the contagious air to be dissipated before it reached dangerous levels.⁹⁰ They also dismissed the evidence from the bills of mortality. The number of deaths from smallpox had been increasing well before 1720. The numbers fluctuated from year to year, so the recent increase was not significant. The increase in deaths increased with the growth of London's population, and since there were no figures for the number of inhabitants, it was impossible to judge whether the proportion of smallpox deaths was increasing. In any case, since smallpox was endemic in London the population was already constantly exposed to the infection and inoculation could do little to increase the spread of the disease.⁹¹

The problem was not simply whether or not inoculated patients spread smallpox. William Black wrote: "It is not only a medical, but also a political, and a great national question, and is well entitled to the most serious attention of the legislature, and of the discerning public."⁹² The question was, who should be inoculated? If, as Dimsdale claimed, inoculated patients spread the disease and increased the number of smallpox deaths, then it had to be practiced with great care, no man having "a right to do an act which may possibly be injurious to others".⁹³ All inoculated patients had to be strictly isolated, effectively limiting the procedure to the better off, who could take elaborate precautions to avoid contact with other people, or patronise inoculation houses. The poor could be inoculated only in hospitals, like the London Smallpox Hospital and Dimsdale argued for the need to expand such facilities.⁹⁴

The dispensary's supporters insisted that the whole population had an equal right to practice inoculation. William Black claimed:

It is natural for every parent, rich or poor, it is their duty to aim at preserving the lives, and even the beauty of their children. I can see no reason why poor persons or middling trades people should hazard the lives of a young family, because their neighbours have scruples against Inoculation.⁹⁵

Dimsdale's proposal that the poor be inoculated in hospitals was not feasible; there were simply far too many susceptible members of the population, most of whom were very young children who needed constant nursing. Such a scheme was unlikely to prove popular since mothers would be unwilling to consign their children into the care of strangers, however well intentioned.⁹⁶

However, if inoculation was hazardous to the population as a whole, then why should the rich be allowed to continue to inoculate, but the poor be denied access to the operation? Dimsdale's rich patients were equally capable of spreading the disease. The Dispensary supporters made no bones about accusing Dimsdale of attempting to further his own lucrative inoculation practice.⁹⁷ "Good God," Black exploded:

that men can be so blind and partial to their own actions, and that they can suffer either a bigotted attachment to a preconceived hypothesis, selfish interest, or stubborn pride so grossly to distort their judgment. If the Baron is so serious in considering *partial* Inoculation as injurious to the community, it is highly criminal in him to be one of the most active instruments in their destruction.⁹⁸

On a purely practical level, partial inoculation would inevitably continue in London. The rich were unlikely to stop inoculating, and as Black pointed out, "Whilst the opulent classes in London are permitted to practice Inoculation, others will imitate them".⁹⁹ Therefore, the only means of

reducing the death toll from smallpox was to make inoculation as widely available as possible, accepting the risks associated with the procedure, in order to enjoy its benefits.¹⁰⁰

The debate initially aroused considerable interest, but it dragged on, fuelled by a personal animosity between the conservative, well established Dimsdale, and Lettsom, the rising star on the London medical scene.¹⁰¹ The public rapidly tired of it.¹⁰² The Monthly Review published increasingly cursory reviews of the pamphlets. In 1779, it summed up Lettsom's Answer to Baron Dimsdale's Review, &c; "More personal altercation, of a very disagreeable kind. We sincerely wish this may be the last publication in this very unimportant and degrading squabble".¹⁰³ In the same vein, the Gentleman's Magazine dismissed another pamphlet as "beneath the notice of the public".¹⁰⁴ The prolonged debate seems to have killed off the Inoculation Dispensary. In 1779, Lettsom reported that the Dispensary was 'flourishing', and it was listed in Simmon's Medical Register for 1780, however, in 1810, it was not listed in Anthony Highmore's comprehensive survey of London charities.¹⁰⁵

Undaunted, practitioners in provincial cities, many of whom belonged to the Fothergill-Lettsom circle, organised schemes to provide free inoculation in the late 1770s and 1780s. They faced the same problems as in London: smallpox was endemic, with periodic epidemics, but they were also well aware of the problems associated with partial inoculation. An anonymous writer in Newcastle, probably John Clark, warned: "such partial Inoculations as have hitherto been performed, however advantageous to individuals, it is to be feared, have contributed very little to the health of the

community."¹⁰⁶ While John Haygarth in Chester noted; "it is necessary, but painful, to remark, that the present mode of partial inoculation, though highly beneficial to individuals, is, on the whole, pernicious to the community".¹⁰⁷ Later, he expressed his concern more crisply. Partial inoculation was "injurious to the poor, though eminently useful to the rich."¹⁰⁸

Later schemes tried to provide free inoculation in such a way to minimise the chances of patients spreading smallpox. The most influential, and elaborate, project was organised in Chester by John Haygarth. Like the originators of the dispensary in London, Haygarth was a dissenter. As in the general inoculations conducted through poor relief, inoculation was part of a series of measures to control smallpox. The whole plan was based around a theory of smallpox contagion, developed in the late 1770s. This theory clearly shows the influence of theories taught at the Edinburgh Medical School - Haygarth attended the school, for two years, studying chemistry with William Cullen. He consulted his old teacher several times while developing his ideas.¹⁰⁹ It was based around the theory that smallpox was spread only by contagion, not through some peculiar 'constitution' of the air. Infection could occur in two ways; by inhaling the 'miasma' given off by someone suffering from smallpox, which was active only very close to the patient, or by coming into contact with the matter in the pocks. Patients were infectious for only a short time; from the second or third day after the eruption appeared until all the scabs fell off, and were particularly infectious during the maturation of the pocks.¹¹⁰

Having defined the means of infection, Haygarth formulated a series of rules to prevent the spread of smallpox. No one susceptible to the disease should enter a house containing a smallpox victim, and victims should not go out once the pocks began to appear, or approach anyone until all the scabs had fallen off. Anything which the patient had handled, and might be contaminated with smallpox matter should be washed and aired.¹¹¹

The rules were put into action by 'the Society for promoting Inoculation and preventing the Natural Small-pox' through a system of inspectors, fines and rewards. Anyone informing the Society of a case of smallpox was given 1/- or 2/6. The Society's inspector - a local apothecary named Robert Owens - went to the infected house, explained the rules of prevention, and gave the family a promissory note, payable if the rules were observed. Originally the reward was five shillings, and double if no neighbours were infected. Later, this was reduced to 5/- or 2/6, the Society fearing that in a large outbreak, their coffers would be unable to keep up the payments. Wealthier families which followed the rules were given public thanks.¹¹² The scheme proved successful. The committee of the Society met monthly at the Infirmary to distribute rewards, and according to a notice of meeting in 1779, the scheme had stopped the spread of smallpox in thirty seven places, including the city's workhouse.¹¹³

It is not clear exactly when the Society began to provide free inoculation; a printed letter of 1780 claimed that inoculation had 'always been' part of the Society's activities.¹¹⁴ The first 'general inoculation' was organised in 1780, when Chester was hit by a smallpox epidemic. Initially, the Society tried to provide inoculation at a special 'hospital', but when no

patients came forward, they switched to inoculating patients in their own homes.

According to the plan, published by Haygarth in 1784, the city was divided into districts, each under the care of one of the Society's inoculators. Other practitioners were paid 5/- per head for inoculating poor people. Subscribers to the Society were asked to distribute handbills announcing the inoculation, and to "exert their further kind offices of recommending patients, and explaining to their ignorant, or inattentive neighbours, the humane intentions of the Society."¹¹⁵ Subscribers of one guinea or more could recommend up to three patients who received premiums for each child inoculated, ranging from 5/- for one child to 10/- for five or more, or four patients without premiums. Those who gave smaller amounts recommended fewer patients. During a second general inoculation, in 1782, the Society did away with the premiums, which were "regarded as a bribe".¹¹⁶

Haygarth circulated his ideas to many practitioners, seeking their opinion. Most agreed with his idea on contagion, and generally approved of his scheme for general inoculation, although a few questioned whether such a system of inspectors, informers and fines did not interfere with 'English Liberty'. Haygarth was quick to respond. In Chester, he claimed, the inspectors were welcomed, and were not regarded as "a *spy* to detect fraudulent gain, but a friendly monitor to warn the ignorant how to avoid poisoning their neighbours and friends."¹¹⁷

However, attempts to replicate Haygarth's programme of smallpox control failed. In Newcastle, the poor would not believe that the disease was contagious, and John Clark, one of the physicians to the Dispensary warned:

With such people, all arguments are fruitless; and unless your plan meet with the concurrence, and assistance of the LEGISLATURE, and be carried into execution by the vigilance of the civil magistrates, I despair of seeing this loathsome and depopulating disease expelled from the British realms.¹¹⁸

In Newcastle, as in other provincial towns, practitioners had to be content with organising free inoculation at local dispensaries, and got around the problem of patients spreading infections by limiting inoculation to short periods, or during epidemics. The Newcastle Dispensary, had provided inoculation since its establishment in 1777.¹¹⁹ Plans for a general inoculation were first put forward in 1779, but were thwarted by lack of funds. In 1786, when the city suffered a severe epidemic, they were revived. A subscription was opened and the Dispensary committee and an equal number of subscribers joined in organising the inoculation. Before embarking on the inoculation, the organisers sought permission from the clergy, magistrates and 'principal inhabitants'.¹²⁰ One local clergyman, William Turner, drummed up support by preaching and publishing a sermon encouraging the poor to take up the offer and the rich to subscribe to the fund, and thereby help to ensure a "supply of skillful artists, industrious tradesmen, intrepid sailors and laborious husbandmen".¹²¹

The actual organisation of the general inoculation was modelled on those at Chester. The city was divided into districts, under the care of a particular practitioner who performed the inoculations, with medicines provided free of charge by the Dispensary. As in Chester, premiums were offered to encourage the poor to take advantage of the scheme. As the author of the Proposals for Promoting General Inoculation in Newcastle pointed out; "The labour of the poorest class of women is so necessary to the subsistence of

their families, that they cannot afford time to nurse their children during the period of the inoculated small-pox".¹²² To help cover any lost wages, parents received 5/- if one child was inoculated, and up to 10/- for four or more children. Non-subscribers could also recommend patients who received no premiums.¹²³

Unusually, Newcastle repeated the general inoculation at regular and frequent intervals, not just during epidemics. Inoculation was provided free in the spring and autumn of 1786, and in succeeding years. However, there were problems if smallpox was not present and no fresh smallpox matter was available. On several occasions, the dispensary staff was forced to use preserved smallpox matter which frequently failed to 'take'.¹²⁴

General inoculations were most commonly organised around dispensaries - although not all provided the service. There are no records of inoculation at the Kelso Dispensary, although it did treat smallpox patients.¹²⁵ A cursory survey shows that the Carlisle dispensary conducted a general inoculation during a smallpox epidemic in 1783, employing the town crier to announce the offer to the townspeople, and that general inoculations were also organised through the dispensaries in Whitehaven, Leeds and Cockermouth.¹²⁶ A more comprehensive search through dispensary records would probably reveal many more general inoculations.

One exception was Edinburgh, where inoculation was provided free of charge by the Royal Colleges of Physicians and Surgeons. This might seem unusual - given the Colleges' reputations as bastions of conservatism, more concerned with defending the status of the medical profession than providing care to the public - however, this was more true of the London College than

its Edinburgh counterpart which had a more progressive outlook reflecting the attitudes of the Medical School professors who dominated its offices.

The Edinburgh Colleges began to debate plans for free inoculation as early as 1771, five years before the creation of the London Inoculation Dispensary. The Deacon of the College of Surgeons proposed that a 'hospital' for inoculation be set up. The College of Physicians formed a committee, which included William Cullen, to look into the matter, but nothing further was heard of the scheme.¹²⁷ Ten years later, in 1781, the College of Physicians approached the College of Surgeons suggesting they organise a general inoculation. A joint committee was formed, and sought advice from a number of authorities, including John Haygarth. Its report, presented in 1782, suggested a fund be raised and a building rented on the outskirts of the city, where on set days the poor would receive free inoculation. The dispensary would be staffed by four members of the College of Surgeons, who would perform the actual inoculations, and an equal number of physicians, to attend patients. However, the plan was rejected by the College of Surgeons, and the physicians seemed unwilling to take on the burden. Instead, both Colleges suggested that their members advertise that they would inoculate the poor free of charge at set times.¹²⁸ No trace of such advertisements has been found in newspapers of the 1780s. The first offer of free inoculation did not appear in the Caledonian Mercury until 1791. It was placed by the College of Physicians, who promised that any poor person applying to any College member during September or October would be inoculated free of charge. The physicians' inoculation committee also wrote to every clergyman in the city, requesting that they explain to their congregations that to refuse inoculation

was to neglect a means which Providence had provided for preserving lives.¹²⁹ There are no records of how successful this scheme was, although the College were sufficiently encouraged by the response that they repeated their offer the following year, apparently with greater success.¹³⁰

Compared to the general inoculations conducted in small towns with the help of the poor relief, those in cities attracted relatively few patients. In Newcastle in 1786 only three hundred and thirty eight children were inoculated, and in 1790, a further three hundred and twenty three.¹³¹ The results of Haygarth's elaborate scheme were even more disappointing. In 1780, only eighty five children were inoculated by the Society and a total of two hundred and eight-eight inoculated in a city of over fourteen thousand. The second general inoculation proved only slightly more successful, with one hundred and twenty eight poor children inoculated.¹³² Other schemes met with a similar response. In Leeds in 1781, three hundred and eighty-three poor were inoculated, and seven years later, only eighty persons were inoculated at the Dispensary. In Liverpool, one hundred and sixteen were inoculated by the Dispensary, and over four hundred by associated practitioners in the general inoculation of 1781.¹³³

General inoculations were more successful in smaller towns, perhaps because it was easier for the whole population to be informed of the scheme. In the town of Whitehaven in Cumbria, which had a population of around eight thousand, the dispensary mounted its first general inoculation in 1783. One hundred and fifty children were prepared for the operation, but despite the strenuous efforts of the staff, most of the parents withdrew, and only thirty children were actually inoculated. A further inoculation ten years later,

was more successful, when one hundred and thirty five children inoculated and a further ninety-four in 1794.¹³⁴ In the even smaller fishing town of Cockermouth, with a population of less than three thousand, one hundred and sixty-one persons were inoculated by the dispensary in 1794.¹³⁵

Persistence also brought rewards. In the first general inoculation mounted by the Carlisle Dispensary, only fifty nine persons were inoculated. John Heysham complained that "few, very few, amongst the vulgar...can be prevailed upon either by promises, rewards or intreaties [sic] to submit to the operation".¹³⁶ In 1786, eighty four were inoculated, and during epidemics in 1793 and 1794, around one hundred and thirty five poor were inoculated. The dispensary continued inoculating, even in years between outbreaks, since the disease was constantly present. In 1784, the dispensary carried out a further ninety one inoculations, and in 1786 another eighty four.¹³⁷ By 1787, Heysham had totally changed his opinion concluding that, writing "since the opening of the Dispensary, the poor have enjoyed the privilege of having their children inoculated gratis; an advantage they have in general with great readiness embraced."¹³⁸

In most cities, writers complained of apathy or resistance to inoculation amongst the inhabitants. Various reasons were put forward. John Haygarth complained that the constant presence of smallpox in cities induced a fatalistic attitude amongst the inhabitants, who simply expected that a number of children would die of the disease. However, he also recorded that working people continued to use a primitive form of inoculation - deliberately exposing their children to a mild case of the natural disease, in the hope that they too would catch a benign form of smallpox.¹³⁹

However, the results may not have been as disappointing as they first appear. In the cities, writers reported very few susceptible subjects; surveys found only seven hundred in Leeds, which had a total population of around 17,000, one thousand in Chester and between three and four thousand in Liverpool.¹⁴⁰ Given the difficulties of conducting comprehensive surveys among a large population, there must be a large measure of under-reporting in these figures. However, they reflected patterns of smallpox incidence. In cities where the disease was endemic, children were more likely to contract the disease at an early age and become immune, whereas in towns and villages where the disease occurred periodically - and where there was a greater chance of avoiding infection - a relatively large pool of susceptible persons could build up.

This is supported by data on the age of smallpox victims and those inoculated in cities. In the 1777 epidemic in Chester, of 163 victims, almost half were under the age of two, and only seven were more than seven years old.¹⁴¹ Similarly, in a smallpox epidemic which hit the town of Warrington, only twelve of the two hundred and eleven victims were over the age of five. The same age range was found in the records of an epidemic in Manchester.¹⁴² The records of the Newcastle general inoculation show that the vast majority of those inoculated were less than five years old, and only four were over the age of seven.¹⁴³

In addition, there is some evidence that general inoculations did control smallpox epidemics. John Heysham reported that the general inoculation in Carlisle in 1783 - when less than sixty persons were inoculated at the Dispensary - cleared the town of smallpox within two months, while

the neighbouring towns of Wigtown and Whitehaven continued to suffer.¹⁴⁴ In Leeds, the inoculation of just three hundred and eighty people also seemed to have halted an outbreak.¹⁴⁵ However, in cities with such a constant flow of people in and out, general inoculation had little effect on the frequency of smallpox epidemics. In Carlisle, smallpox was cleared from the town, only to reappear the following year. In 1787, Heysham claimed that the practice had led to a decline in smallpox deaths, but it is hard to see why; that year, smallpox claimed thirty victims in the town, the highest since 1779.

The institutionalised provision of inoculation, was, at best, of limited success. In the country towns and villages of the south of England, general inoculations organised through the system of poor relief were relatively common, and highly effective, in curtailing smallpox epidemics and reducing the frequency of outbreaks. In cities, however, the problems of controlling the spread of infection from inoculated patients prevented the practice from being routinely provided by hospitals and dispensaries. Long after the debate over the London Dispensary, general inoculations in cities remained rare, and of questionable effect.

The creation of institutions for inoculation also marked the end of the old elite's dominance over the procedure. In the 1770s, a new group of physicians created institutions to provide inoculation as a form of public health care, intending to make the practice available to the whole population. The conservative old elite, who did not share a concern for the peoples' health, were left to attack their efforts. It was the last time they participated in a debate over inoculation; they soon faded away.

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129. Minutes of the Royal College of Physicians, 2nd August, 1791.
130. Minutes of the Royal College of Surgeons, 15th May, 1782; Minutes of the Royal College of Physicians, 2nd August, 1791; 7th August, 1792.
131. Haygarth, Sketch, 383.
132. Haygarth, Inquiry, 198.
133. Haygarth, Sketch, 451-53, 524.
134. State of the Whitehaven Dispensary, 1783, 1793, 1794; Whitehall Evening Post July 24-27, 1784.
135. Report of the Cockermonth Dispensary, 1794.
136. Heysham, Observations on the Bills of Mortality...for...1779, 6.

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137. Heysham, Observations on the Bills of Mortality..for.. 1786, [1793, 1794].
138. Heysham, Observations on the Bills of Mortality...for...1787, 4.
139. Haygarth, Inquiry, 200.
140. Razzell, Conquest of Smallpox, 73.
141. Haygarth, Inquiry, 156, 159.
142. Thomas Percival, 'Tables shewing the number of deaths occasioned by the Small-Pox in the several periods of life...in Manchester' in his Philosophical, Medical and Experimental Essays, 89, 92.
143. Report of the Committee for the promotion of general inoculation in Newcastle-upon-Tyne and Gateshead, n.p., [1787].
144. Heysham, Observations on the Bills of Mortality.. for...1783, 4.
145. Haygarth, Sketch, 524n.

Chapter Six: The End of Inoculation

In the last two decades of the eighteenth century, inoculation flourished as never before. The success of the Suttonian method and the provision of free inoculation through the Poor Law and dispensaries opened the procedure to virtually the entire population. Ironically, the popularity of inoculation contributed to its decline. The similarity between the techniques and the underlying concepts of inoculation and vaccination greatly accelerated adoption of the new procedure. However, it is a measure of how well inoculation was established that it took fully forty years before the new procedure completely superseded inoculation.

Although inoculation and vaccination have been portrayed as very different processes, the two procedures were in fact very similar. In the early nineteenth century, vaccination was frequently referred to as 'cowpox inoculation'. The well established techniques of inoculation - of collecting matter, its insertion, and the care of the patient - were borrowed wholesale by the early vaccinators. Inoculation created a constituency for vaccination. By 1790, the idea of deliberate infection in order to prevent smallpox was well established, and vaccination quickly became popular amongst the upper and middle classes who had championed inoculation.

However, vaccination did not immediately supercede inoculation. Some physicians mounted a vehement campaign against the new procedure and the poor in country towns were reluctant to give up inoculation, which had proved such a success in controlling smallpox. In fact, the two practices co-existed for over thirty years. One factor in particular swung the balance in

favour of vaccination; unlike inoculated patients, vaccinated patients were not infectious. As a result, vaccine institutes flourished where the inoculation dispensaries had failed. As well as providing free vaccination to the poor, the institutes supplied lymph to practitioners with which to vaccinate their wealthy patients. They also provided a context for systematic investigation of the new procedure, and helped to defend it against strong opposition. Vaccination also held out the prospect of eradicating smallpox, and its supporters were able to take advantage of a growing concern over public health, winning state support for the vaccine institutes, and securing the legislation which finally brought inoculation to an end.

Edward Jenner's discovery of vaccination has become a medical myth. Jenner has become a heroic figure, "the pioneer of vaccination, the man who vanquished the terror of smallpox".¹ Vaccination is characterised as a radically new practice which replaced inoculation - a procedure almost as dangerous as the disease it was intended to prevent.² In the process of glorifying Jenner, historians have created a sharp division between inoculation and vaccination. In practice there was a fundamental continuity between the two procedures. Jenner's famous 'invention' consisted of substituting cowpox for smallpox matter; it was simply a modification of inoculation.

Jenner was inspired to perform his famous experiments described in the Inquiry into the causes and effects of the Variolae Vaccinae of 1798 by the observation that a casual infection with cowpox provided immunity to smallpox. Cowpox produced lesions on the udders of dairy cattle, from which

the infection was passed to milkers through any small cuts or abrasions on their hands. In humans, the disease produced characteristic painful ulcers and a slight fever, but was never serious or fatal. The immunity to smallpox created by cowpox came to the attention of the medical profession in the late eighteenth century when practitioners tried to inoculate milkers and found that the procedure produced no effect.

In 1796, Jenner attempted to replicate this phenomenon. He inoculated an eight year old boy, James Phipps, using fluid from a cowpox sore on the hand of a milkmaid instead of smallpox matter. Seven days after the operation, Phipps had developed a lesion at both inoculation sites, the glands in his armpit were swollen and he had a slight fever. Jenner proved that the boy had become immune to smallpox by inoculating him with smallpox matter after seven weeks and again some months later. Neither had any effect.

Two years later, Jenner confirmed his results in a second series of experiments. One child was successfully inoculated with matter taken directly from a cow. Matter was then taken from the incision site, which was used to inoculate 'several' other children and adults by further arm to arm transfers of matter. All had the same symptoms as James Phipps, with a lesion at the vaccination site and slight feverish symptoms.

From his observations and experiments, Jenner concluded that cowpox produced immunity to smallpox because the two diseases were closely related. According to Jenner, Phipps' lesions were "much the same as when produced...by variolous matter".³ In the second edition of the Inquiry, published in 1801, he recalled how

This...[similarity to smallpox] was in great measure new to me, and I shall ever recollect the pleasing sensations it excited; as, from its similarity to the pustule produced by variolous inoculation, it incontestably pointed out the close connection between the two diseases.⁴

Jenner believed that the similarities between cowpox and smallpox proved that the diseases had a common origin. Both arose from a disease known as 'grease', which caused fluid-filled lesions on the heels of horses and, like cowpox, infected humans producing ulcers. Over time, grease had become transformed into smallpox. Jenner wrote:

the source of the Small Pox is morbid matter of a peculiar kind, generated by a disease in the horse, and that accidental circumstances may have again and again arisen, still working new changes upon it, until it has acquired the contagious and malignant form under which we now commonly see it making its devastations among us.⁵

Cowpox was produced when farm workers dressed the grease sores of horses and transferred the matter to the udders of cows during milking. To test his theory, Jenner inoculated a child using matter from a farm worker infected with grease. This produced a pustule similar to that of cowpox, although, in Jenner's opinion, not so closely resembling smallpox. He was unable to test the immunity produced because the child died of a 'work-house' fever shortly after.⁶

There was some debate over the principle of vaccination. Jenner's theory that both cowpox and smallpox arose from grease was dismissed by William Woodville in 1799, who reported that he was unable to produce cowpox by inoculating cows with grease. Three years later, John Loy succeeded in producing the disease in cows, using matter from a case of grease in a human.⁷ Generally, it was accepted by later writers - Richard Dunning extended the idea, suggesting that all contagious diseases like smallpox and

measles had developed from animal diseases, and suggested that it might be possible to reconstruct the evolutionary relationship between the various forms of the disease.⁸

However, the mechanism by which cowpox protected against smallpox remained obscure. There was a clear similarity in that both diseases were produced by the application of matter; both were morbid 'poisons' able to induce a specific set of symptoms. However, the relationship between cowpox and smallpox was complex; though a case of cowpox gave immunity to smallpox, it did not prevent further cases of cowpox. Equally, if a person had had smallpox, this gave them no protection against cowpox. Most later writers fell in with Pearson's vague notion that cowpox produced a 'state of inexcitability' in the body, so that smallpox infection had no effect.⁹

Although the theoretical explanations of vaccination - as the procedure was labelled - remained vague, there was no doubt that casual infection with cowpox did produce immunity to smallpox. In the first work supporting Jenner, The Inquiry Concerning the History of Cow Pox, George Pearson collected reports from practitioners throughout the south of England and workers at London's dairy farms confirming the effects of cowpox. Pearson also tested the immunity produced by having three dairymen who had had cowpox but not smallpox inoculated at the London Smallpox Hospital. The procedure caused some slight inflammation, but otherwise had no effect.¹⁰

Since inoculated smallpox proved as effective as the natural disease in conferring immunity, practitioners argued that deliberate infection with cowpox would have all the beneficial effects of casual infection. However, there were no practical demonstrations until 1799. Pearson also unearthed a

number of reports of inoculations with cowpox but was unable to repeat Jenner's experiments because there was no vaccine available; Jenner had lost the strain of vaccine used in his 1798 experiments, and although widely known, cowpox was a relatively rare disease, appearing mainly in the spring. However, in January 1799, William Woodville, physician to the London Smallpox Hospital, received a report that cowpox had appeared in a London dairy and that several workers were infected. Having compared the lesions on the milkers' hands with the plates from Jenner's paper Woodville was convinced that they were suffering from genuine cowpox. Using matter from a cow and from an infected worker he began to vaccinate patients at the London Smallpox Hospital, publishing the results of his practice later that year. The Reports of a Series of Inoculations for the Variolae Vaccinae contained two hundred detailed case histories of vaccinated patients and recorded a further three hundred and ten successful vaccinations.

Woodville's findings broadly agreed with those of Jenner. His patients developed a lesion at the vaccination site, and suffered a slight fever, and thereafter resisted inoculation. However, a number of Woodville's patients also had a generalised eruption, similar to that of smallpox. This provoked a brief but heated debate; Jenner claimed that the rash showed that Woodville's vaccine had become contaminated with smallpox matter, while Woodville argued that it was due to the 'variolous atmosphere' of the hospital.¹¹

Woodville had passed his vaccine on to several other practitioners, who were more successful. They reported that vaccination produced only one lesion, and concluded that if a rash did occur, it was rarely serious and the consequence of poor technique, exposure to smallpox infection or a general

'irritation' of the body.¹² They confirmed Jenner's hopes that vaccination offered all the benefits of inoculation with none of the drawbacks. They assumed, that like inoculation, it produced perfect immunity to smallpox; but vaccination induced a much milder disease with no dangerous symptoms and consequently was never fatal. Because it did not produce a general eruption, patients were left with only one scar at the vaccination site. Most importantly, it was not infectious, so there was no need to isolate patients during the procedure.¹³

Detailed descriptions of vaccination technique, included in a series of pamphlets from 1801, shows how vaccinators adopted the techniques developed in inoculation practice. In both cases, practitioners had to select appropriate candidates. As with the very successful methods of inoculation used in the 1790s, vaccination could be safely practiced on all ages and all constitutions. In addition, vaccination was suitable even for pregnant women who ran the risk of miscarriage under inoculation, and patients suffering from chronic skin complaints such as scrofula. However, practitioners were unanimous that teething children should not be vaccinated; at this time, their bodies were in a highly irritable state and any stimulus might provoke convulsions. Many also advised against vaccinating infants, because the operation sometimes failed, but others advocated vaccination for children as young as six or eight weeks.¹⁴ As in later methods of inoculation, no preparation was required.

Vaccination technique was borrowed directly from inoculation. Infective matter was taken from a lesion of a vaccinated patient by puncturing the vesicle to release a little fluid. Slightly more care had to be exercised over

the time at which the vaccine was taken; any liquid smallpox matter was infectious at all times, but vaccine had to be taken between the sixth and tenth days after vaccination. Like smallpox matter, the vaccine could be preserved by drying it on thread, lancets, or pieces of glass. Later, techniques of sealing the fluid in small vials or between glass plates were developed.¹⁵

The actual vaccination technique was taken directly from inoculation. A lancet was dipped in the fresh matter, or in preserved matter which had been moistened with a very little water or steam, and was then used to make a puncture or slight scratch. As in inoculation, care had to be taken that the incision was neither too shallow so that the vaccination did not take, nor too deep, so that the wound was likely to become inflamed. If the matter had been dried on a thread, a small piece was placed over a scratch for twenty four hours. One incision was sufficient to ensure infection, but most practitioners followed George Bell's advice and vaccinated patients in both arms, so that one lesion could be used to supply vaccine material, and the other left intact, allowing the practitioner to observe the progress of the vaccination.¹⁶

As in inoculation, the development of the lesion was observed closely to ensure that the infective matter had affected the whole body and had not just produced a local lesion, leaving the patient susceptible to smallpox. If the vaccination had been successful, an inflamed spot appeared three days later which increased in size and gradually formed the fluid-filled vesicle. Unlike the irregular pustule produced by smallpox inoculation, the vaccination vesicle was perfectly circular, and the matter did not form pus. Instead, it dried to produce a shiny, dark brown scab which fell off leaving a characteristic scar. If the vaccination had been successful, a red ring or 'areola'

appeared around the lesion on the seventh or eighth day.¹⁷ Patients also developed a slight fever around this time. If no areola appeared, or the practitioner was unsure of the success, the vaccination could be tested by revaccinating the patient. If the original vaccination had taken, the second vaccination site developed very rapidly, until it resembled the first.¹⁸

Vaccinated patients required even less medical treatment than inoculated patients. Some practitioners suggested that patients be kept to a temperate diet during vaccination, but Richard Dunning claimed it was unnecessary. He prescribed such a diet only to 'amuse' his patients.¹⁹ Occasionally, the fever rose high enough to require cooling drinks or purges. More often, the vaccination site became inflamed, but this was easily treated by poultices, mercurial ointments or bathing in vinegar and water.²⁰

As well as providing a model for vaccination technique, inoculation helped to smooth the path for the adoption of vaccination. Inoculation had established a basic principle of preventative medicine in the minds of patients and practitioners. In 1720, the idea that patients could be deliberately infected with a disease to protect them against further attacks was completely new and - metaphorically as well as literally - foreign; by 1800, it had been common currency for over seventy years, and had been in general use for almost fifty years. As a result, vaccination was rapidly adopted among medical practitioners and the upper and middle classes who had previously had their children inoculated.

The very gradual adoption of inoculation in the 1720s, when the practice was taken up by only a few elite physicians, stands in sharp contrast to the speed with which a substantial proportion of the medical profession

embraced vaccination. In March 1799, George Pearson sent a circular letter to two hundred practitioners containing a thread impregnated with vaccine.²¹ The following year the Medical and Physical Journal received reports of vaccination from all over the country; from Montrose in Scotland to Cork in Ireland, and throughout England. Testimonials to its safety and efficacy, signed by large numbers of practitioners from London, Leeds, Durham, Chester, York, Hull, Birmingham, Plymouth, Bradford, Suffolk and Colchester were published in the new medical journals.²²

These practitioners worked among the upper and middle classes who had previously had their children inoculated. Edward Jenner vaccinated extensively and promoted his practice among the nobility in the fashionable spa town of Cheltenham. Even in Montrose, a small town in Scotland, the local practitioner noted that the earliest vaccinations were carried out among the "first families" of the district.²³ The upper classes adopted vaccination very quickly. Initial resistance to the new procedure rapidly fell away and one Edinburgh surgeon reported that within two months vaccination had totally replaced inoculation in his practice.²⁴

As with inoculation, the clergy played an important role in promoting the practice and were often the first to have their families vaccinated. Dunning for example reported that local objections to vaccination were largely overcome by the successful vaccination of a child of the Reverend Hitchings.²⁵ Significant numbers of the clergy also performed the new procedure, some vaccinating substantial numbers. Mr. Reed, curate at Leckhamstead vaccinated one thousand five hundred and seventy-eight in one year, while G. C. Jenner claimed to have performed over three thousand

vaccinations.²⁶ In rural areas of Scotland, the clergy were encouraged to vaccinate by the medical profession; George Bell dedicated his 1802 Treatise to the clergy, and two years later, the general Assembly of the Church of Scotland helped to distribute instructions for vaccination to all ministers - apparently to good effect - in 1805, ministers were reported to be vaccinating throughout the Highlands.²⁷ The gentry, who traditionally treated their poorer neighbours, added vaccination to their medical skills. Not all practitioners approved; Robert Willan admitted that 'Clergymen, ladies and country gentlemen' might acquire a knowledge of vaccination, but they were unable to deal with any bad symptoms.²⁸ James Moore noted that the "country ladies who practiced vaccination "from timidity,...were watchful, strictly compliant with prescribed rules, and consequently successful."²⁹

The role of lay vaccinators should not be underestimated; their practice was not confined to areas poorly supplied with regular practitioners. In the county town of Cupar, Fife, which had four practitioners in 1780, Henry Dewar found only ten of fifty four children had been vaccinated by medical men. The remainder had gone through the operation at the hands of "midwives, clergymen and neighbours".³⁰

Estimates of the total number of vaccinations performed in the early years of vaccination stand in marked contrast to the nine hundred or so inoculations performed between 1721 and 1729. Jenner reckoned that six thousand vaccinations had been carried out in the first three years of the practice; but this was probably an underestimate. In 1801, John Coakley Lettsom put the figure at sixty thousand.³¹

However, not all practitioners were convinced that cowpox provided a safe, effective substitute for smallpox inoculation. The rationale for vaccination was challenged in the early years of the nineteenth century, in some of the most colourful writing ever to grace a pamphlet debate. Like the early opponents of inoculation who argued in the 1720s that inoculated smallpox was quite different from the natural disease, medical men and members of the public argued that smallpox and cowpox were radically different diseases. Smallpox was known only in humans, whereas cowpox ordinarily only effected cows. They warned of the horrific side effects of introducing a "bestial humour" into the human constitution, and that vaccinated patients would take on bovine characteristics, inspiring Gillray's famous cartoon of 1802, where cows sprouted from vaccinated patients. The cartoon actually had a serious medical counterpart; in 1805 William Rowley, physician to the Marylebone Hospital, described the case of the 'ox-faced boy' where vaccination caused swellings to the glands around the face, giving the appearance of a cow. Rowley and other practitioners also reported cases of 'cow-pox mange', abscesses and ulcers and other severe constitutional diseases produced by the "ulcerous, stinking, horrid" cowpox.³² Benjamin Moseley, physician to the Royal Chelsea Hospital later classified these side effects as *facies bovilla* or cow-pox face, *scabies bovilla*, *tinae bovilla* and *elephantiasis bovilla*.³³ He also warned that vaccination did not just produce physical disfigurement, reporting in horror; "I have seen children rendered nearly ideots [sic] by the Cow Pox poison. Some adults have had their intellects impaired by it; and some have suffered insanity."³⁴

Moseley and his colleagues warned that vaccinated patients risked their constitution and wits for nothing, ridiculing the idea that cowpox could provide protection against a completely different disease. One anonymous objector wondered "How any idea of such a subject...could ever have entered into the mind of a rational being."³⁵ Objectors criticised the way in which vaccination had not been subjected to any trials - as had inoculation. Reflecting the poor understanding of the mechanism by which cowpox conferred immunity, Benjamin Moseley attacked vaccination as an "amulet against the small-pox".³⁶ Although cowpox might make the body less prone to smallpox infection, it could have no permanent effect. He argued that the procedure was now pursued only through blind enthusiasm by a small group of practitioners suffering from 'cow mania'.³⁷

Objectors were quick to publicise cases where vaccinated patients subsequently caught smallpox. In 1804, William Goldson published Cases of Small Pox, subsequent to Vaccination and the following year, published details of a further five cases of smallpox. In the same year, William Rowley collected over four hundred instances of smallpox after vaccination or bad side effects.³⁸ Not all such cases were published by those who sought to discredit vaccination; in 1809 Thomas Brown, an Edinburgh surgeon who had previously been an advocate of vaccination, described several of his own patients who had later suffered from smallpox.³⁹

The opponents of vaccination called for a return to inoculation. The older procedure was tried and tested; in recent years the technique had become so refined that, contrary to the claims of the vaccination lobby, very

few patients died or were left with scars. It was known not to produce any serious side effects, and conferred complete immunity to smallpox.

The supporters of vaccination were quick to defend the new procedure. Robert Thornton attempted to reduce to absurdity the alarmist claims of vaccination side effects, by including an engraving of a 'cow-poxed woman', complete with a pair of horns in his Vaccinae Vindicia of 1806.⁴⁰ Most writers were content to reassure the public that vaccination was safe and effective, and that its bovine origins did not mean it produced 'filthy diseases'.⁴¹ Occasionally their language became as extravagant as that of their opponents. John Coakley Lettsom portrayed the cow as

An animal whose lactarious fountains afford in our infancy a substitute for that of the parent, and from which we draw, through life, a considerable portion of our nutriment, is destined by the sagacity of one enlightened philosopher to protect the human species from the most loathsome and noxious disease to which it is subjected.⁴²

Reports of vaccinated patients who subsequently caught smallpox received more serious consideration. In cases of smallpox shortly after vaccination, the supporters questioned the diagnosis, suggesting that the patients actually had chickenpox or a slight eruption produced by repeated exposure to smallpox infection.⁴³ Alternatively they cast doubt on the vaccinators' technique - suggesting that the vaccine was ineffective, having been kept too long or taken too late, or that the vaccination had produced only a lesion, but not the generalised symptoms.⁴⁴ They countered claims that vaccination did not produce immunity by pointing out that casual cowpox protected against smallpox for ten or twenty years, and there was no reason why the immunity conferred by vaccination should be only temporary.⁴⁵

Not all cases were so easily explained away. In a well publicised incident in 1804, two children living in Fullwood's Rents caught smallpox two years after vaccination. They had undergone the procedure at the London Smallpox Hospital, so there was no doubt that the vaccinations had been correctly performed. The vaccination lobby was forced to admit that these cases were a failure of vaccination, but argued they were analogous to the very small number of cases where patients suffered smallpox after inoculation. Very occasional failures were no reason to stop vaccinating, since, as case histories collected in works such as John King's Treatise showed, the vast majority of vaccinated patients resisted infection.⁴⁶ One writer claimed "The Vaccine Inoculation has been brought before the tribunal of the public with such a *weight* of evidence, that I think an *impartial* jury must give a verdict in its favour."⁴⁷

However, a large section of the public remained unconvinced of the merits of vaccination. In those areas where general inoculation had proved most successful, the reaction to the new procedure was, at best, lukewarm. Vaccination was made available through the system of poor relief in the first years of the nineteenth century. In Essex 'vaccine inoculation' was used in the parish of Castle Hedingham in 1802 and in Great Braxted two years later.⁴⁸ General vaccinations were organised in three villages near Newcastle in 1802, and ninety three paupers were vaccinated in the poor-house at Reigate the following year.⁴⁹ However, many parishes offered a choice of vaccination or inoculation - in 1808, families in the Essex parishes of Messing and Barking were left to decide whether to have their children inoculated with smallpox or cowpox. Where given such a choice, the poor often

preferred inoculation. In the parish of Wickford in 1811, thirty four children were inoculated and seven vaccinated.⁵⁰ A similar pattern is found in Scotland, and will be further discussed in chapter seven. According to the replies to the census of 1811, vaccination was less popular in those counties where inoculation was well established.

Inoculation even enjoyed something of a comeback in the 1820s, as it became obvious that the immunity conferred by vaccination was not permanent. In 1811, the National Vaccine Establishment reported on two well publicised cases of smallpox after vaccination. While admitting that both patients had been properly vaccinated, but had still caught smallpox, they pointed out that in both cases, the patients recovered well, and attributed this to the earlier vaccination.⁵¹ The temporary nature of the immunity conferred by vaccination was more fully revealed in the smallpox epidemic of 1816-1817. Large numbers of the victims had been vaccinated; Henry Dewar reported that no less than fifty four of the seventy inhabitants of Cupar who caught smallpox had been vaccinated. However, very few died; most had mild cases with a rash not unlike chickenpox, which developed much more quickly than normal smallpox, leading Dewar to suggest it was a 'modified' form of the disease. This provoked another brief debate as to whether the disease was smallpox or chickenpox.⁵²

In spite of the large number of failures, practitioners continued to argue that parents should have their children vaccinated, for even if the procedure provided only temporary immunity it protected very young children from smallpox and ensured only a very mild case. Practitioners were very slow to advocate revaccination at regular intervals, perhaps feeling, like

Thomas Brown, that for vaccination to provide complete immunity, it would have to be repeated at intervals throughout life.⁵³

Consequently, there was a resurgence in the use of inoculation during the epidemics of 1816-1817 and 1825-1826. A few practitioners argued for return to the old procedure. Thomas Brown suggested that infants be vaccinated, then inoculated six to eight years later to provide complete immunity to smallpox. In 1819, a survey of practitioners around Norfolk revealed that a large proportion were still inoculating; in addition there were a large number of lay inoculators operating throughout England. Parish records show that inoculation was provided through poor relief well into the 1820s. General inoculations were carried out in the parish of Bosham in 1821, and in Great Missenden in 1824, following an unsuccessful general vaccination. Given a choice of inoculation and vaccination, in Wickford, in 1827 thirty six children were inoculated and only nine vaccinated.⁵⁴ In these areas, the use of inoculation only declined in the 1830s. Many parishes stopped offering inoculation at this time, and where a choice of inoculation and vaccination was available, the poor increasingly chose the new procedure.⁵⁵

However, vaccination did eventually supercede inoculation. A major factor in its final success was the vaccine institutions, which sprang up over the country, providing free vaccination to the poor and lymph to private practitioners.

In many ways, the vaccine institutes were similar to the inoculation dispensaries. They shared the same basic organisation; both were funded and managed by subscribers, for the same reasons of humanity and patriotism.

According to the Royal Jennerian Society, vaccination was an issue of importance to "every man who has just regard for himself, his family, for his friends, or for his country".⁵⁶ The subscriptions covered the costs of the buildings, and the salaries of a secretary and a porter. Medical care was provided by physicians, consulting physicians, surgeons and apothecaries. In the larger London institutions these posts were salaried, but elsewhere they rotated among local medical men.⁵⁷ Patients, recommended by subscribers, were vaccinated at the institute but nursed at home, returning three or four times to have the vaccination checked.

Vaccine institutions sprang up astonishingly quickly all over the country. In London, vaccination was available from the Smallpox Hospital from 1799. The first institution purely for vaccination - the Vaccine Pock Institute - opened in January 1800. In 1803, it was joined by the Royal Jennerian Society for the Extermination of the Small-Pox. Although Edward Jenner was its nominal head it was organised by John Coakley Lettsom, whose inoculation dispensary had aroused such controversy thirty years earlier. Lettsom had become a strong advocate of vaccination, ironically, because he had come to believe that inoculation spread smallpox - the point which he had previously been at such pains to refute. The Royal Jennerian Society was a much larger organisation than Pearson's inoculation dispensary, with thirteen 'vaccination stations' throughout the city. In 1808 a third dispensary - the London Vaccine Institute opened its doors. In addition, vaccination was also available free of charge at the Finsbury, Bloomsbury, Western and Public Dispensaries and the grandly-titled Universal Medical Institute.⁵⁸

Vaccination was adopted just as eagerly in the provinces. The dispensaries in York, Birmingham, Bath, Newcastle, Whitehaven and Manchester were offering vaccination by 1802.⁵⁹ In Nottingham, vaccination was provided by the General Hospital in 1800, and six years later a separate vaccine institute was founded. Vaccination was also provided on a county-wide basis. In 1804, the Royal Sussex Jennerian Institute established sixteen vaccine stations throughout the county, and the Royal Somerset Jennerian Society launched an even more extensive programme in 1805 with twenty eight stations.⁶⁰ Scotland had its first vaccine institute, attached to the Edinburgh Public Dispensary organised in February 1800, just a month after the Vaccine Pock Institution opened. In the same year, the Royal College of Physicians and Surgeons of Glasgow offered free vaccination, as did the Aberdeen Dispensary.⁶¹ Ireland was, by comparison, slow off the mark. The Dublin Cow-Pock Institute was opened in 1804.⁶² This list is by no means exhaustive; probably many more established hospitals and dispensaries were vaccinating in the first decade of the nineteenth century.

The vaccine institutes attracted very large numbers of patients. The Vaccine Pock Institute performed three hundred and seventeen vaccinations in its first year, two hundred and eighty seven in 1801, but over five hundred in 1802, and, with more than a touch of false modesty, Pearson apologised for the small number of vaccinations. He explained that few poor people lived close to the Institute.⁶³ The Institute's record was quickly put in the shade by that of the Royal Jennerian Society. Within eighteen months of its founding, it had vaccinated a massive twelve thousand persons.⁶⁴ The provincial societies were also highly successful. The Royal Somerset Jennerian Society

performed a thousand vaccinations in its first year and the Edinburgh Vaccine Institute vaccinated almost four thousand patients in four years.⁶⁵

The controversy over vaccination after 1804 had little impact on the institutes' ability to attract patients. At the London Smallpox Hospital the number of vaccinations declined after 1805 from two thousand to sixteen hundred, while inoculations doubled from two to over four thousand five hundred. However, the trend was shortlived. By 1808, vaccination and inoculation were again equally popular.⁶⁶ Elsewhere, the number of vaccinations increased steadily. The Dublin Institute vaccinated over five hundred patients in 1804, thirteen hundred in 1806, and almost four thousand in 1809. In 1806 the Nottingham Vaccine Institution vaccinated over a thousand people in six months.⁶⁷

The great success of the vaccine institutes was partly due to the nature of vaccination; it was much safer than inoculation, and cowpox was not infectious so vaccinated patients presented no risk to the public. It was also a result of serving a much wider audience; in addition to vaccinating the poor, as we have seen, the institutes also supplied practitioners with the lymph used to vaccinate their private patients. The supply of vaccine initially presented problems. With inoculation, it was relatively simple to obtain matter from someone suffering from natural smallpox, but with vaccination, infective material had to be obtained from an earlier patient. Initially vaccine was provided by a small group of practitioners eager to promote the new procedure. George Pearson, John Ring and John Coakley Lettsom in London, and a Mr. Anderson in Leith provided vaccine from their own practice.⁶⁸

Even once vaccine had been obtained, it was difficult for individual practitioners to have a constant stream of patients and thus of lymph.⁶⁹

The vaccine institutes provided practitioners all over the country with a reliable supply of vaccine. When patients returned for the progress of the lesion to be checked, lymph was taken. Because of the need for lymph, some institutions did away with the requirement that patients produce a letter of recommendation from a subscriber proving that they were worthy of care, cutting the long established direct link between patients and benefactors.⁷⁰ Most institutes sent out vaccine free of charge, although the Vaccine Pock Institute requested that practitioners make a 'contribution' of half a guinea. Even so, Pearson boasted that requests for vaccine arrived daily.⁷¹ The institutes sent out enormous numbers of 'charges' of vaccine; by 1805, the Royal Jennerian Society had distributed nineteen thousand doses of vaccine; by 1809, the Dublin Cow-Pock Institute was providing two thousand five hundred charges per year.⁷²

The vaccine institutes reflected more general changes in the role of institutions between 1770 and 1800. Besides providing free care, they also had a research function, collecting and disseminating information about vaccination among the general public and the medical profession.⁷³ The plan of the Vaccine Pock Institute included an explicit research agenda; it stated

the present Institution is perhaps the best imaginable for procuring evidence to inform those who are unacquainted with the new practice; for determining all doubtful points relating to it, and for discovering errors: as every case will be registered; every new trial made under the direction of the Medical Establishment belonging to the Institute; and all the results of the practice will be reported to the Governors.⁷⁴

George Pearson offered twelve-week lecture courses to practitioners and interested members of the public, who could also observe vaccination.⁷⁵

Other institutes distributed instructions on the correct procedure for vaccination.

Not surprisingly, vaccine institutes played a prominent role defending the new procedure. When practitioners questioned the immunity provided by vaccination, the institutes used their records of vaccinations to prove the success of the procedure. In 1804, the Dublin Cow-Pock Institute and the Royal Somerset Jennerian Society announced they knew of no failures of vaccination, and the Vaccine Pock Institute offered a five guinea reward to any of its patients who could prove that they had subsequently had smallpox.⁷⁶ The Royal Jennerian Society formed a committee to investigate reported failures of vaccination while a surgeon at the Dublin Cow Pock Institute tested the immunity of earlier vaccinations by inoculating a group of foundlings vaccinated three or four years earlier, and reported that all resisted infection.⁷⁷

Unlike inoculation, the supporters of vaccination were able to attract state support. In the early nineteenth century, the British government was increasingly willing to assume responsibility for public health care. Vaccination - which held out the prospect of finally eradicating smallpox - was one of the first forms of medical care to receive state funding. Although inoculation had received the patronage of the court and nobility, they were unable to attract government support; even the London Smallpox Hospital, the best established and best patronised institution was unable to persuade the government to help cover the costs of their new hospital built in the

1760s.⁷⁸ The state, on the other hand, was involved in vaccination in a number of ways. The procedure was given official sanction in 1800 when it was adopted by the army and navy - the advantage of vaccination being that soldiers and sailors did not have to be taken away from their duties while undergoing the procedure. It received a further seal of approval in 1802 when a parliamentary committee, having heard evidence from medical practitioners, voted Jenner a grant of £10,000 in recognition of his life-saving discovery. Five years later, they gave a second grant of £20,000.⁷⁹

The government became directly involved in the provision of vaccination with the formation of the National Vaccine Institute in 1807. The institution had its origins in a bitter dispute over vaccination technique between Jenner and John Walker, the resident inoculator at the Royal Jennerian Society.⁸⁰ Walker resigned and founded the London Vaccine Institute, while the Jennerian Society struggled on, its reputation badly damaged. In 1807, its remaining supporters joined with the London Colleges of Physicians and Surgeons, who had just reported to parliament on the benefits of vaccination, to present a scheme for a National Vaccine Establishment.⁸¹

Government intervention was also responsible for bringing inoculation to an end. The supporters of vaccination had been lobbying the government to make inoculation illegal since 1807, when Jenner and Lettsom approached various ministers. This, and a second attempt in 1813 were unsuccessful. However, in the late 1830s, when inoculation was declining, Britain suffered its most severe smallpox epidemic for decades. Between 1837 and 1840, forty two thousand died of the disease. As a result, parliament

passed an act 'to extend the Practice of Vaccination' in England and Wales. This required the Poor Law Guardians to vaccinate their charges and made inoculation illegal, punishable by up to a months imprisonment.⁸²

This first act was reinforced thirteen years later by legislation requiring compulsory vaccination of all children by the age of three months and in 1867 and 1871, by further legislation, the latter appointing vaccination officers. However, there was persistent resistance to vaccination among the poorer classes and as a result, although vaccination greatly reduced the incidence of smallpox during the nineteenth century, there were further epidemics in 1870-1873 and 1902.⁸³ Endemic smallpox was not finally eradicated from Britain until 1934.⁸⁴

In the twentieth century, vaccination has been portrayed as much superior to inoculation. However, this impression arises from the fact that it was, until very recently, the major weapon against smallpox. In the early nineteenth century, however, there was a strong continuity between the two procedures. Vaccination was seen as a form of inoculation, and the techniques were taken directly from the older procedure. Inoculation also accelerated the adoption of vaccination by establishing the principles of immunisation among patients and practitioners. Even the vaccine institutes, though much more successful than the inoculation dispensaries, borrowed their predecessors' organisational form.

The length of time it took for vaccination to supersede inoculation shows that the much vaunted advantages of vaccination over inoculation were also less clear cut than the conventional history would have us believe. Although supporters of vaccination were quick to stress that vaccination was

milder and never fatal, inoculation had a good record of success by the 1790s, and patients were not afraid to turn to inoculation again, when it was shown that the immunity conferred by vaccination was only temporary. However, by the 1820s, perhaps even by the first decade, the end of inoculation was inevitable. Vaccination held out the hope of eradicating smallpox, and it rapidly attracted the support of all influential groups; the medical profession, the Colleges of Physicians, and the government. However, it is a measure of the continuing impact of inoculation that it finally took an act of parliament to bring one hundred and twenty years of practice to an end.

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Chapter Seven: Pox Caledonia - The Impact of Inoculation in Scotland

Having traced the history of inoculation from its introduction to its decline, I will now turn to a different question - whether inoculation reduced the number of smallpox deaths and contribute to population growth in the late eighteenth century. This is a contentious issue. In the 1960s, Peter Razzell argued strongly that inoculation protected a significant portion of the population against smallpox, causing a decline in the number of deaths and a rise in populationb but later writers have questioned whether inoculation could have been responsible for such a large population increase.

Both Razzell and his critics have based their arguments on data from the south of England, and particularly on parish inoculation records. This chapter reexamines Razzell's argument using a detailed study of inoculation in Scotland. Scotland lends itself to such a survey since there is a unique and rich source of data on inoculation in the 1790s within the Statistical Account of Scotland. The picture of inoculation provided by Statistical Account is quite different from that described by Razzell. He describes a steady growth in inoculation as the practice became cheaper and available to a larger and larger section of the population, so that it was universally used by the end of the century. However, in Scotland, inoculation was not widely used; many parents still believed that the procedure was dangerous and refused to inoculate their children, and there were very few schemes to provide free inoculation. The strongest influence on the popularity of the practice was religious belief. Although inoculation was in general use in several counties, where there was support for the secession churches, the poor refused to

inoculate their children, fearing that the procedure interfered with the workings of Divine providence. As a result, inoculation was not sufficiently popular to have any major effect on population growth in Scotland. Where the procedure had come into general use, ministers attributed population growth to inoculation, but over the country as a whole, the procedure made only a minor impact on the number of smallpox deaths. The disease declined only in the early nineteenth century, with the introduction of vaccination.

Opinions as to the contribution of inoculation on population growth have varied widely. In the eighteenth century the main rationale for inoculation was that it had a much lower death rate than the natural disease. Fifty years later, the inoculation dispensaries appealed for subscribers by arguing that inoculation saved the lives of valuable workers and thereby contributed to the wealth of the nation. Towards the end of the century writers investigating population growth pointed to inoculation as a cause of the rapid increase. In 1782, John Howlett made a survey of parish records, and concluded that the increase in population was due "chiefly to that distinguished blessing of providence, inoculation."¹ Arthur Young, John Heysham and a number of early nineteenth century writers also attributed reduced mortality and increased population to the practice.² In the nineteenth century, vaccinators sought to discredit inoculation by arguing that the practice had spread smallpox, increasing the number of deaths.

In the twentieth century, opinions as to the effect of inoculation have varied widely. Historians included inoculation alongside such varied factors as a decline in gin drinking, improved diet, environmental engineering, the

advent of washable cotton clothes and general improvements in standards of medical care to account for the declining mortality rate.³ However, in the 1960s, Thomas McKeown and R. G. Brown challenged the idea that medicine had in fact contributed to population growth. They argued that mortality was largely due to infectious disease and that advances in surgery, midwifery, drug therapy, and hospital provision had little effect on these diseases. Although inoculation was effective in preventing smallpox, they believed it could not have caused the observed rise in population.⁴

By far the strongest statement on the role of inoculation has been put forward by Peter Razzell. In a series of articles and The Conquest of Smallpox. Using extensive research into inoculation practice, he claimed that inoculation had been a major factor in population growth in the second half of the eighteenth century. Inoculation, which did indeed save lives, was generally accepted by the medical profession. With the advent of cheap inoculation after 1767 and schemes for the provision of mass inoculation by the end of the eighteenth century the practice "had become so widespread...that only a relatively small proportion of the population was left unprotected".⁵ Consequently, the number of smallpox deaths, which had accounted for twenty to twenty five percent of all mortality, was greatly reduced. Razzell reinforced this argument by pointing to a correlation between population growth and the use of inoculation; while population grew very slowly from 1710 to 1740, the rate of increase rose around 1750, and remained high for the rest of the century, mirroring the growing popularity of inoculation.⁶

Razzell's thesis has come in for a good deal of criticism. Recent demographic studies have suggested that most population increase was due not to declining mortality, but to increasing fertility and changing patterns of nuptuality.⁷ Even with regard to mortality, many historians have felt Razzell spoilt a good argument by overstating the case, particularly by overestimating the number of deaths from smallpox.⁸ When J. R. Smith examined the data on inoculation and smallpox mortality for the county of Essex he discovered that smallpox caused around ten percent of all deaths - less than half the figure given by Razzell - and consequently that the reduction of deaths from smallpox alone could not explain such a large increase in population. Smith concluded that, though inoculation did lower mortality and contributed to population growth, Razzell's claims "should be treated with caution".⁹

There is a second reason to doubt Razzell's conclusion. He draws much of his data from records of general inoculations organised through poor relief. However, though these were common in the South of England, they were rare elsewhere.

This chapter takes a fresh look at the impact of inoculation on population growth through a study of Scotland for which there is a uniquely rich and detailed archive of inoculation practice contained within Sir John Sinclair's Statistical Account of Scotland. Razzell made some use of the Old Statistical Account (as it is usually called to distinguish it from later surveys) mainly to show that inoculation was practiced even in remote rural areas by the 1790s. However, this source provides much more information on the practice of inoculation, and deserves closer examination.

Compiled in the 1790s, the Old Statistical Account (hereafter OSA) is a comprehensive survey of Scotland carried out under the auspices of the Church of Scotland, to supply information on social problems.

Questionnaires were sent to the ministers of all nine hundred and thirty eight parishes in Scotland, requesting information on a wide range of topics - social, economic, agricultural, religious. The kirk ministers were in a unique position to record everyday life. They took an active role in the temporal affairs of the community, the church acting as a local judiciary, and a welfare system as well as controlling the moral behaviour of parishoners.¹⁰ Their reports varied in length and content - ministers felt free to express their own grievances, opinions and interests - but the overall result was twenty-one large volumes which are "unsurpassable for vivid and important details of the eighteenth century material existence".¹¹

The sheer size of the Old Statistical Account, and the fact that it was not indexed until the most recent edition, has meant that it has not been used to construct a picture of inoculation in Scotland. Even Scottish historians seem to have been unaware of the quantity of information on inoculation it contains. Well over two hundred - almost a quarter - of the returns mention inoculation, and the level of reporting is remarkably consistent; in twenty nine of the thirty three counties, between one half and one fifth of all ministers made some reference to the popularity or unpopularity of the practice.¹² These reports are valuable because they reflect the use of inoculation much more accurately than the English parish records. The OSA records not only schemes for free inoculation but also estimate the extent to which inoculation was used by private families. Accounts occasionally give

the numbers of persons inoculated; more often they describe the use of inoculation in qualitative terms, as 'rare' or 'general'. In addition, they provide a wealth of anecdotal material on when and how inoculation was introduced, which social groups were using the operation and which were not, who performed the operation, and the reaction of ordinary people.

The history of inoculation in Scotland up to 1790 was typical of the whole of Britain. Inoculation was introduced in 1726 Charles Maitland, the Scottish surgeon who had also performed the first inoculation in Britain in 1721. On a journey to his native Aberdeenshire, Maitland inoculated ten children, one of whom unfortunately, died.¹³ The next recorded inoculations were performed in 1733, by a Dumfries physician, Ebenezer Gilchrist. Thereafter, the practice seems to have spread over the country; it was practiced in Aberdeen in the 1740s and by 1755, over four hundred people had been inoculated around Carlisle. Inoculation was even reported on the Orkney islands off the north coast.¹⁴ However, it was by no means widely practiced; one correspondent to the Scot's Magazine recorded that in the Highlands the operation was so expensive as to be beyond the reach of ordinary people.¹⁵

In 1765, when Alexander Monro conducted his survey for the Paris faculty, described in chapter three, inoculation was used in nearly every county of Scotland, mainly by the upper classes; Monro noted that "The greater numbers of the gentry, and most of the medical gentleman have their children inoculated".¹⁶ As discussed in chapter three the number of inoculations was still fairly small, with just over five and a half thousand inoculations performed. This represents less than one in two hundred of the

population; or between one and two percent of children under the age of ten. Its popularity varied widely. In part this reflected the enthusiasm of individual practitioners; in Banff, for example, one practitioner carried out over three hundred inoculations. It also reflected the local history of the practice - the large number of inoculations recorded in Dumfriesshire reflect the long history of the practice in that area. Generally speaking, however, inoculation was most popular in the counties around Edinburgh and Glasgow. (see Appendices III - V)

Although there are only scattered references to the use of inoculation after 1765, the popularity of the procedure seems to have grown. The Scots' Magazine reported that over three hundred children had been inoculated in Kirkwall in 1770.¹⁷ By 1771, the Edinburgh College of Physicians and Surgeons contemplated schemes for providing free inoculation, although they were not put into practice till the 1780s or 1790s.

However, the accounts contained in the OSA reveal that inoculation had not come into general use by the 1790s. Although the medical profession were enthusiastic about the new procedure, the general population were not as eager as to adopt innovations in medical practice. Though patterns of thought and practice changed rapidly in the eighteenth century medical literature, it took much longer for new methods of treatment to filter down to the mass of the people. Perhaps the most striking example is in the treatment of smallpox. A number of ministers reported that the 'hot method' rejected by Thomas Sydenham in the mid seventeenth century was still in use in Scotland over a hundred years later.¹⁸ One described how

great fires were kept burning in the rooms, or rather stoves, where often 2 or 3 wretched children lay gasping under a weight of clothes, in one bed. Every particle of fresh air was excluded with the utmost care; and whisky and saffron, and every thing heating, were administered with an unsparing hand. The consequence was such as might be expected. Numbers were hurried into an untimely grave.¹⁹

Elsewhere Sydenham's 'cool' method of treatment was still unusual enough to be noteworthy.²⁰

Not surprisingly, the common people were still cautious of inoculation. Although the medical profession were unanimous in their belief that inoculation was a safe, simple procedure, Scottish parents still feared for their childrens' safety. The minister of Kilmadock in Perthshire explained "The country people conceive it highly improper to permit any act that tends to bring trouble or distress on their helpless infants."²¹ The medical profession did thier best to allay these fears. One enterprising practitioner even

opened a policy of insurance for the small-pox! If a subscriber gives him two guineas for inoculating his child, the surgeon, in the event of the child's death, pays ten guineas to the parent. For every guinea subscribed, four guineas, for one half guinea, two guineas; and for a crown, one guinea.²²

It is not recorded if any parents took up his offer.

As a result, children were inoculated only when they faced a real risk of catching smallpox - just before or during an epidemic. For example in the parish of Buchanan in Stirlingshire

The disease spreading fast, about 30 of the young people in the neighbourhood where it was, took it; 10 of whom died. All the parents whose children had not taken it, (two or three excepted), as if it were with one consent, inoculated their children at one and the same time; so that there are just now under inoculation in this parish 128.²³

While in Cromarty "the people were never more reconciled to the salutary mean of inoculation" than during epidemics.²⁴ Bad smallpox epidemics often provided the incentive for the adoption of inoculation. In the parish of Balquhidder in Perthshire an outbreak "alarmed the neighbourhood and introduced inoculation with success".²⁵ When the threat of smallpox disappeared, the practice lapsed. In Longforan, Perthshire, the minister wrote "Inoculation has been practiced here, and many submitted to it thankfully, when strongly recommended to them some years ago; but for some time past it seems to have been forgotten."²⁶ Equally, where smallpox had proved mild, causing few deaths, inoculation made little progress.²⁷ With so little public confidence in the procedure, any deaths brought inoculation to a halt. In Largs, the minister explained that "the least accident tends to discredit" inoculation.²⁸ The practice was also hindered "owing to it having proved fatal in one or two instances" in Avendale, Lanarkshire.²⁹

In sharp contrast to the south of England, schemes to provide free inoculation were very few and far between. Although the Scottish system of poor relief was roughly similar to its counterpart in England - each parish raised funds from its wealthier landowners which were distributed by the church officers to parishioners unable to support themselves - the church rarely paid for the inoculation of the poor.³⁰ The OSA contains only one account of a general inoculation organised and paid for by the church in response to extreme circumstances. In Kirkwall in the Orkney islands the harvest failed in 1782 and 1783 and shortly after smallpox appeared for the first time in a number of years. In an attempt to avert a large number of deaths, the kirk session - as church officers are known in Scotland - agreed to

pay for the inoculation of all children whose parents could not afford the operation. The scheme was not an unqualified success - the parish had a population of around two and a half thousand, but less than forty children were inoculated.³¹

More often schemes were paid for by the owners of large estates. The earliest general inoculations took place in Perthshire in the 1780s, under the auspices of the Commission for Forfeited Estates. They acted as *de facto* landlord for lands confiscated from supporters of the failed Jacobite Rising of 1745.³² On the estates around Crieff and Struan, medical practitioners performed general inoculations, with some success. Andrew Murray inoculated almost two hundred children around Crieff, while John McLagan inoculated over one hundred and fifty. One landowner continued the practice when the lands were returned to his family.³³

Schemes in the 1790s were largely confined to the Highlands and Borders. The OSA gives few details of who were inoculated, but the overall impression is that, unlike those in English towns and villages, they involved few people and children formed the bulk of the patients. They were most common in the southern counties of Berwickshire and Roxburghshire.³⁴

Lord Douglas paid for the inoculation of poor children in the parish of Southdean, while the honourable Baron Rutherford paid for the inoculation of the children on his estate in Roxburgh.³⁵ In the islands, the laird of the small island of Muck paid for the inoculation of all its inhabitants.³⁶

Ministers on the island of Tiree and in Unst on Shetland, mention that 'general inoculation' had taken place, although they did not record who had organised or paid for the schemes. In Towie in Aberdeenshire, a local

landowner footed the bill for a general inoculation organised by the minister. As a result, "all the children and young people, some of them twenty years of age and upwards, who had not formerly had the smallpox, were inoculated at once."³⁷ In Durness in Sutherland, too, a local landowner paid for the inoculation of the poor.

Medical practitioners also inoculated the poor free of charge. In Edinburgh, after several false starts, the Royal College of Physicians offered to inoculate the poor free of charge in 1791 and 1792. In 1796, when Caithness was hit by a bad smallpox epidemic, John Williamson, surgeon to the 2nd battalion of Rothsay and Caithness Fencibles, conducted a 'general inoculation' inoculating over six hundred children in ten months.³⁸ In the parish of Deer, a surgeon inoculated over one hundred people gratis and free inoculation was also provided by practitioners in Stirlingshire and Aberdeenshire.³⁹

These free inoculations still covered only a tiny fraction of Scotland's nine hundred parishes. It raises the question of whether the poor really had access to inoculation or were barred from adopting the procedure by the costs involved. Certainly, the only detailed records of a general inoculation, performed around Crieff in 1775, suggests that a large proportion of the population could not afford inoculation. As in England, not only paupers, but the children of tradesmen including smiths, wrights, a miller, shoemakers, tailors, a flesher, weavers and flaxdressers were inoculated free of charge.⁴⁰

In the 1790s, many ministers believed that free inoculation would greatly encourage the practice and a number of them used the OSA to call for national schemes. The minister of Kilwinning in Ayr called for surgeons to

be paid by the government for notifying all cases of smallpox and inoculating the poor.⁴¹ One minister aware that rural areas were poorly served by medical practitioners turned to the church as the institution best able to reach the whole population. He suggested that divinity students be taught to perform inoculation. Another proposed that inoculation be organised by the Society for the Propagation of Christian Knowledge, a charitable society which had schools throughout the west of Scotland. The Society could either pay for a surgeon to inoculate all the children attending their schools, or teach their schoolmasters to perform the operation. The minister had no doubt that the task was not beyond them. After all, "if the women inoculate in the east, (as we are told they do)," he wrote, "schoolmasters certainly might, with very few lessons, be taught to do it here".⁴²

However there is also evidence that the cost of inoculation did not prevent the poor from inoculating. Very few ministers cited the cost of inoculation as a reason why it was not generally used. The minister of Aberdour in Fife was a rare exception, when he pointed out "A workman, with a small family, hath very little to spare to the surgeon."⁴³ It must be remembered that those unable to afford the fees of a regular medical practitioner could turn to the large number of lay inoculators practicing throughout Scotland, many of whom offered their services free of charge.

Lay inoculators came from a curious mixture of backgrounds. Members of the upper classes - ministers, gentlewomen and 'young gentlemen' who traditionally offered ex-officio medical care inoculated their poorer neighbours free. Some had substantial practices. William Mitchell, the minister of the parish of Tingwall

finding that the common people declined to inoculate their children, in consequence of the expense attending it when a regular surgeon was employed, resolved to undertake it himself, without charging them anything, and carried it on with great success, having inoculated no less a number than 950, between the years 1774 and 1793.⁴⁴

Others came from a motley assortment of trades, many with no particular connection to medicine. On Mid Yell, 'several thousand' inoculations had been performed by a local jack-of-all trades, John Williamson, who developed an idiosyncratic technique of drying smallpox matter over peat smoke, then burying it for seven or eight years in order to lessen its virulence. Although odd, the method apparently proved highly successful.⁴⁵ Seven hundred people around Applecross were inoculated by a square wright and "a man, in no respect noted for acquired knowledge".⁴⁶ In Aithsting on Shetland, about one hundred persons were inoculated "by common men, who pretended to no skill, and gave no medicines".⁴⁷ Parents also inoculated their own children on Harris, North Uist and the small islands of I, Ross and Broilass off Mull and in Fifeshire, Perthshire, Renfrew and Peebles.⁴⁸

Perhaps the most striking feature of inoculation practice revealed by the OSA is that its popularity varied widely over the country. It was most popular on the islands, where smallpox epidemics had a devastating effect. In 1764, the disease had not appeared on the small island of Rhum for some twenty nine years, and at that time twenty four adults - almost one-fifth of its total population - had never had smallpox and lived in "the greatest Dread, as the Disease had lately appeared in some of the Adjacent Islands".⁴⁹ When smallpox finally appeared on islands, the mortality was enormous. St. Kilda, the most remote of the inhabited Scottish islands "was very near stript of all

its Inhabitants" when the disease appeared on the island for the first time.⁵⁰ Similarly, on the island of Foula in the Shetland Isles after a smallpox epidemic "only a few persons were left, to perform the last office of humanity to their brethren".⁵¹ Even on the less remote islands of the Inner Hebrides, smallpox epidemics caused a tremendous loss of life. One fifteenth of the total population of Barra had were killed the disease after the island had been free of smallpox for twelve years, while on Tiree smallpox killed one hundred of its sixteen hundred inhabitants in 1758.⁵²

Inoculation was in general use among all ranks of society on nearly all the islands - the Inner and Outer Hebrides, Orkney and Shetland. On Shetland, in Northmaven, it was "perfectly general".⁵³ On Mid Yell inoculation was practiced "even by the common people".⁵⁴ The popularity of the practice amongst the poorer classes was a source of pride to local ministers. The incumbant of Bressay recorded that "the people...submit to this operation with a degree of readiness which does them credit".⁵⁵ On some islands a large proportion of the population were protected, approaching the levels covered by general inoculation in towns in the south of England. In the parish of Aithsting over six hundred were inoculated during an epidemic in 1791, more than half of the total population. However, an additional two hundred and fifty refused to be inoculated and were fortunate to escape the disease.⁵⁶ In the parish of Tingwall, the nine hundred and fifty inhabitants inoculated by the minister represented around half of the total population.

In the Borders, too, inoculation was popular, encouraged by the hnadful of schemes for free inoculation. In Eccles, where 'the gentlemen of the parish' paid for the inoculation of poor children "this act increased its use

more than the use of reason."⁵⁷ In Earlstown, Berwickshire, the Honourable Mr. and Mrs. Baillie had paid for the inoculation of over seventy children, after which inoculation was "generally practiced".⁵⁸ A large proportion of the inhabitants were inoculated in some parishes. In Jedburgh, where the 'heritors' - the local landowners - had given a 'small sum' to help reduce the costs of inoculation to the poor, the minister noted that over a thousand inhabitants had been inoculated by one physician alone, and that other practitioners were also successfully inoculating. Since the population of the parish was less than two thousand, a majority of the inhabitants must have undergone the procedure.⁵⁹ Even in parishes where there was no provision of inoculation, the procedure was popular. Ministers reported that inoculation was in general use in Dumfriesshire in the parishes of Dornock, Kirkconnel, Morton, Sanquar, Tinwald and Westerkirk, while in the counties of Kirkcudbright and Wigtownshire inoculation was frequently used in twelve parishes.

For reasons which are not immediately obvious, inoculation was also popular in North Perthshire and over much of mainland Argyllshire. It was universally practiced in the parishes of Blairgowrie, Comrie, Dull, Fortingal, Monzie and Weem. In Glassary, inoculation was reported to have "prevailed" for twenty years. In the parish of Killean and Kilchenzie, with a population of less than two thousand, one hundred children were inoculated in one year, while the minister of Killbrandon claimed " the majority of children are inoculated".⁶⁰

However, over the rest of the country, only the better off consistently made use of inoculation. Everywhere, ministers recorded that the children

and servants of gentlemen, farmers, and 'the better sort of inhabitants', were inoculated.⁶¹ One minister recorded that the procedure was used "by the gentlemen, and such of their dependents as have been prevailed upon...to permit their children to be inoculated".⁶²

The reluctance among the poor to adopt inoculation was not due to the cost, but to religious objections. All disease was sent by God as a form of punishment. Inoculation tempted Providence by deliberately inducing a dangerous disease, and the subsequent protection against smallpox interfered with the Divine ability to send disease. Such objections dated back to the introduction of inoculation in 1720, but had not appeared in print since Thomas Delafaye's sermons in the 1750s. However, they had a strong hold in the minds of the common people of Scotland. In 1758, a correspondent to the Scot's Magazine had noted a prejudice against inoculation, as had Alexander Monro in 1765.⁶³ Such objections were a lingering remnant of seventeenth century Calvinist theology which were revived by the secession churches in the late eighteenth century.⁶⁴

Such beliefs were not shared by the whole population. The richer, better educated classes, including the clergy of the Church of Scotland who subscribed to a more moderate theology, did their best to persuade the poor of the benefits of inoculation.⁶⁵ Ministers argued that inoculation did not contravene Divine law any more than other forms of medical treatment intended to save lives.

Does not the man, for instance, equally tempt GOD, who, apprehending a mortification in one of his limbs, submits to lose it by the operation of a surgeon. Perhaps the dreaded mortification might not have taken place, and the patient sacrifices his life to timid caution. Yet no man of common sense will dispute, that the practice of

amputation is salutary on the whole, and is the means of preserving many valuable lives to the community.⁶⁶

Others simply argued that God had given man the knowledge of inoculation, and therefore it was a religious duty to practice it.⁶⁷ The arguments were not confined to the pages of the OSA. The minister of Auchterhouse reportedly

argued with [his congregation] in private, and recommended inoculation from the pulpit. He told them, that many of the most pious and popular clergymen had adopted the scheme in their own families; and that, from the great success that attended it in every quarter of the globe, there was good reason to conclude, that it was a scheme highly favoured by Providence.⁶⁸

Inoculation remained unpopular in those areas where the secession churches found support. It was little used in the north of Scotland - in Invernesshire, and Ross and Cromarty, where one minister lamented that "the people still retain a strong prejudice against it, and seem deaf to all arguments used to show its lawfulness and expediency, as a mean which providence has blessed for saving thousands of lives."⁶⁹ The minister of Urray in Ross and Cromarty reported that "The gentry inoculate their children for the small-pox with success, but the great body of the people have not surmounted their religious prejudices against that innovation."⁷⁰ In the parish of Tough, in Aberdeenshire, a successful demonstration of inoculation did nothing to influence local opinion. One family were inoculated "and got through remarkably well; but so violent were the prejudices of the people, that, it is said, some of them declared, if the inoculated children had died, they would have considered it as a just dispensation of Providence."⁷¹

Secession also found support farther north in Nairnshire and the inland areas of Moray and Banffshire. Consequently, in the parish of Auldearn:

the people are averse to inoculation, from the general gloominess of their faith, which teaches them that all disease which afflict the human frame are instances of the Divine interposition, for the punishment of sin; any interference, therefore, on their part, they deem an usurpation of the prerogative of the Almighty.⁷²

In Banffshire inoculation was not "relished, among the lower ranks"⁷³ and was "by no means become general."⁷⁴

Farther south, in Kincardineshire and parts of Angus the inhabitants were also reluctant to inoculate; the procedure was "not used" in Nigg, it made "little progress" in Banchory Davenick, and was not popular in Marykirk despite attempts to promote its use.⁷⁵ Even the efforts of the energetic minister of Auchterhouse were "all in vain. Their prejudices remained, and their children continued to die".⁷⁶ Attempts to encourage the practice by offering free inoculation failed dismally. In Dunnichen, a free inoculation was organised, and the "measure was recommended in church by the minister, and privately by the whole kirk-session, yet, so strongly do the ancient prejudices prevail against this mode of communicating the distemper, that only 9 or 10 children have been inoculated".⁷⁷ A scheme in Kirkden met with a similar outcome; "In vain, the patriotic Mr. Dempster provided, last season, an able physician and proper medicines: Though inoculation by these means, may have been got 'gratis', hardly one accepted the generous offer."⁷⁸

Even in the Borders, where inoculation was generally popular, the ministers of Castletown and Bowden noted that the seceders living in their parishes refused to adopt the practice.⁷⁹ Support for secession churches also explains prejudice against inoculation in the parishes of Cockburnspath,

Coldingham and Chirnside in Berwickshire. The minister of Kirkmabreck, Kirkcudbright complained:

there are many of these little innocents, that fall victims [sic] to the inattention, stupidity, and superstition of their parents, who are so wedded to their ancient prejudices, that rather than part with them, they will consign over half-a-dozen fine children to the ravages of this terrible disorder, or, perhaps, to the gloomy mansions of the tomb.⁸⁰

Although eighteenth century writers suggested that inoculation was less popular in cities because smallpox was endemic and people became inured to deaths from the disease, in Scotland, religious objection accounts for its unpopularity in urban areas.⁸¹ The secession churches drew much of their support from the labouring classes in the growing towns and cities of the western lowlands, particularly Renfrewshire, Stirling, Dumbarton, and to a lesser extent in the Lothians in the east.⁸² The strongest resistance to inoculation was recorded around Glasgow. In Greenock, in Renfrewshire, the minister recorded that "the lower sort of people...will not be persuaded to avail themselves of inoculation."⁸³ In Innerkip, the people had "an unconquerable aversion to inoculation".⁸⁴ While in Cathcart "The prejudices against inoculation are so deeply rooted, that...it has yet made but small progress".⁸⁵ In Eaglesham the minister reported "there is no reconciling the minds of the lower ranks to inoculation. In 1786, a few children were inoculated, and it seemed to give pain to the people in general, that they came so well and easily through."⁸⁶

It was a similar story in the adjoining areas of Lanarkshire, where the minister of Stonehouse noted that "Some have begun to inoculate: In every instance where tried, it was successful; but the prejudices of the people against

it are so strong, that it is not gaining ground."⁸⁷ In East Kilbride, the minister angrily reported

Rooted prejudices, founded upon arguments, some of which are trifling, and others absurd, influence the minds of the people so much against it, that they sit still, in sullen contentment, and see their children cut off in multitudes.⁸⁸

The minister of Carmunnock raged "the people from a sort of blind fatality, will not hear of inoculation, though attempts have often been made to remove their scruples on this subject."⁸⁹ In these areas, virtually no inoculations were performed. In Symington, Ayr, there had been only "two or three" instances of inoculation, and in Kilwinning, inoculation was practiced in only two or three families.⁹⁰

The persistent objections to inoculation drove the minister of Kilwinning, Ayrshire to despair.

This impious presumption, these illiberal and groundless prejudices, are not peculiar to this parish; in every other country parish in Scotland, the great bulk of the people think and act pretty much in the same way. it is well known, at least to the clergy, that every argument in support of inoculation, however conclusive or self evident, makes no impression upon their minds.⁹¹

However, he was being overly pessimistic. Over large parts of Scotland, beliefs in an active Providence were giving way to a less Calvinist theology. One minister observed:

the universal belief of the lower ranks of people, appears to have been, that there was a fatality in all circumstances of life, that the most trivial circumstances had been foreordained, and that consequently, no person could either accelerate, or escape his fated death [but now] they have dropped that idea, and begin to be sensible, that man is left, at least in many things, to the freedom of his own will, and that as a free agent, he may be instrumental in promoting his own temporal happiness, or multiplying his misfortunes.⁹²

In such areas, ministers efforts to encourage inoculation met with success. In Morven in Argyllshire

On the incumbants coming to the parish, they were much prejudiced against inoculation: But whether owing to his endeavours, or to the success of the practice ...during the last visit to the country had from this dangerous disorder, the generality not only agreed to inoculation, but many performed the operation on their own children.⁹³

Ministers often inoculated their own children, serving as a practical demonstration of the procedure. When another minister inoculated three of his five children

the people seemed to be shocked and offended; but when he came to have [the] other two fit subjects, he warned his neighbours of his intention to inoculate these also. The example was followed immediately then, by the inoculation of 30 children in the parish.⁹⁴

Successful demonstrations of inoculation also helped overcome objections to the procedure in Kilninver in Argyll, where "the lower class of people have quite got the better of the prejudices which they once entertained against it, which nothing but a conviction from experience of its salutary effects, could have overcome."⁹⁵ In Innerleithen, Selkirk "gains ground from the experience of its usefulness, though contrary to the theory of religious prejudice."⁹⁶

By the end of the century, inoculation was steadily gaining ground in Invernesshire. There "The prejudices, entertained by the inhabitants of this parish against inoculation, were, for a long time, invincible. But the better sort, setting the example, the rest gradually followed".⁹⁷ In parts of Forfarshire, too, resistance broke down and the people of Edzell were "fast surmounting their prejudices against inoculation".⁹⁸ In the town of Forfar itself, objections to the practice "daily losses [sic] ground".⁹⁹ Inoculation was

also increasingly used in the counties of Berwickshire, Dumbartonshire and particularly in Fife, where in Leuchars, "Some years ago, the people in this parish professed a religious scruple against innoculating [sic] their children. They are now come to look upon it as a religious duty to adopt the practice."¹⁰⁰ While in Newburgh, "the good sense, and well directed affection of parents begin to overturn any prejudices."¹⁰¹ Often, the adoption of inoculation was not unanimous - in Rathen, Aberdeenshire, people were beginning to adopt inoculation, except the fisher families, who continued to reject the practice.¹⁰²

Although inoculation had become popular in some parishes and was increasingly used in many others, it had little impact on mortality levels or population growth. In the few areas where inoculation was in general use, ministers did note a decline in smallpox incidence. On Mid Yell, in the Shetland islands "formerly, the small-pox occasioned the most dreadful ravages, in these islands....Now, hardly any suffer by this disorder."¹⁰³ Throughout the Borders, smallpox was declining. In Newabbey, Kirkcudbright, the minister reported that "the former virulence and ravages of the small-pox are much abated" as a result of inoculation.¹⁰⁴ His colleague in Eccles claimed that smallpox was 'greatly mitigated' by inoculation.¹⁰⁵ Elsewhere on the mainland, ministers in Aberdeenshire, Ross & Cromarty, Inverness and Perthshire noted a decline of epidemic smallpox following the use of inoculation.¹⁰⁶ The minister of Weem described how: "Before the practice of inoculation was introduced, the small-pox generally carried off one in 7; but since inoculation has become pretty general, not 1 in 200."¹⁰⁷ In Rosemarkie in Ross and Cromarty, the incidence of smallpox was reduced by

inoculation so that "very few" had died from the disease in the last twenty years.¹⁰⁸

In these areas, ministers believed that inoculation had contributed to a growth in population. In three of the seven parishes on the island of Skye, where smallpox had previously "wiped out whole families", ministers linked the growth in population to inoculation and reduction in smallpox mortality.¹⁰⁹ Ministers on Tiree, Unst, and Mid Yell in the Shetland islands agreed, but in Applecross, the minister believed that inoculation had not been practiced long enough for it to have had an effect on population size.¹¹⁰

Where inoculation was not in general use, its effects are harder to judge. The practice protected those who were inoculated, but some ministers reported that inoculation helped to spread smallpox and increase mortality.

In Rayne, Aberdeenshire, the minister claimed that

The infection is communicated from the inoculated to the children of those who still retain their old prejudices; and thus we have the smallpox raging every year in a place, where...about 30 years ago, the distemper used to come about once in 4 or 5 years.¹¹¹

The minister on the island of Cumbrae believed that smallpox was more frequent since the introduction of inoculation, and the minister of Torthorwald, Dumfriesshire produced a table of mortality to prove that the number of smallpox deaths had actually increased with the use of inoculation.¹¹²

Any decline in smallpox mortality seems to have been a very local phenomenon. There is little correlation between the use of inoculation and the mortality rates for different areas. Where inoculation was popular, mortality rates fell at the same rate as the country as a whole. In the Borders,

mortality actually increased in the 1780s and 1790s, when inoculation was most popular. Similarly in the Highlands and Hebrides, mortality fell only slightly in the 1790s.¹¹³

Nationally, it had no discernable effect. Scottish data confirms that Peter Razzell's figure of twenty percent of all deaths attributable to smallpox is too high. In Scotland, where legislation requiring records of death were frequently ignored, the quality of recording varies widely and it is clear that deaths among infants - many of whom fell victim to smallpox - were underrecorded. Some bills of mortality from country parishes show from five to ten percent of deaths resulting from smallpox.¹¹⁴ In the Edinburgh bills of mortality, which is known to have under reported child deaths, the figure is between eight and thirteen percent of deaths. Carefully kept records such as those from Tranent, Kilmarnock and Cathcart record smallpox as the cause of around sixteen percent of deaths.¹¹⁵ Even if inoculation had eradicated smallpox, this could account for only part of the population growth in the second half of the century. Between 1755 and 1801 the population grew by at least 28%, and possibly as much as 33%.¹¹⁶

The changes in the levels of growth show little correlation with the use of inoculation. The population of Scotland was growing slowly between 1700 to 1739 before significant number of inoculations were performed. While inoculation was gradually established in Scotland, the growth rate decreased in 1740s, then began to increase again in the 1760s and thereafter it fluctuated; increasing rapidly in the 1770s and 1780s, before falling off again in the 1790s, when inoculation was most popular in the late 1790s.

Clearly, inoculation was not a major factor in population increase, but, as Michael Flinn suggests had a 'marginal' effect.¹¹⁷ Other factors were probably more important; and the ministers writing for the OSA were well aware of it. In Sanquar, in the borders, the minister claimed that "the success attending the inoculation of children, and the improved mode of living and cleanliness among the people, are likewise among the causes of the increased population."¹¹⁸ On North Uist the minister attributed population growth to the landlord's preference for letting land to small tenants, early marriage and inoculation.¹¹⁹ The minister of Kirkmabreck believed that population growth was due to inoculation, improvement of land and new manufactures.¹²⁰

There is one final piece of evidence which suggests that inoculation failed to reduce deaths from smallpox in the population figures for the nineteenth century. As described in chapter six, vaccination was introduced into Scotland in 1800 and rapidly became popular. In the cities, where there had been little inoculation, large numbers of inhabitants were vaccinated free of charge at the Edinburgh Vaccine Institute, the Glasgow College of Physicians and Surgeons, and the Aberdeen Dispensary. In rural areas, large numbers were vaccinated by ministers of the Church of Scotland. The impact of the new practice was recorded in the census of 1811. When asked what factors had led to population growth, around ten percent of responses cited vaccination; particularly from the counties where inoculation was not popular. Population growth was frequently attributed to vaccination in Bute, Ayrshire, Lanark, and parts of Perthshire, Fife and Kirkcudbright.¹²¹

Their observation is confirmed by the population statistics. Robert Watt's data on smallpox deaths among children in Glasgow suggests that vaccination had a dramatic impact on the disease. Up to 1801, smallpox caused, on average, around eighteen percent of all deaths in children under the age of ten; in 1802, this fell to less than nine percent. The decline was sustained; between 1801 and 1805, smallpox caused around ten percent of deaths and between 1806 and 1810, this fell to four percent.¹²² The figures for Glasgow are mirrored in the statistics for the country as a whole. In Edinburgh, the percentage of deaths due to smallpox fell to less than four percent in the first decade of the nineteenth century and to less than two percent in the following decade. This corresponds to a rise in population growth rates after 1803 lasting through to the 1820s.¹²³

The record of inoculation in Scotland contained in the OSA provides a valuable contrast to that presented by Razzell. It shows that inoculation was much less popular than the data from the south of England might suggest. Even though inoculation had been practiced with success for seventy years, it had not been generally adopted in Scotland. Many of the common people were reluctant to adopt the practice, objecting to the practice on religious grounds, or fearing that their children might die under the operation. As a result, inoculation played a real but less dominant part in the decline of mortality or population growth on Scotland. In some small areas, where generally used, it contributed to declining mortality and population increase, but this is counterbalanced by reports that in some parishes it may have increased the number of smallpox deaths. This study casts doubt on Peter Razzell's conclusions that inoculation was a significant factor in population

change over the country as a whole and demonstrates that eighteenth century populations were capable of substantial growth where inoculation did not control smallpox.

It is all too easy to exaggerate the impact of inoculation. Inoculation was a radically new form of medical treatment - preventing rather than curing disease - a technique which, in the nineteenth and twentieth century, has done much to control many devastating diseases, including smallpox. However, it is important to view inoculation within its eighteenth century context. For those that had overcome their fears, and could afford the fees or had access to free inoculation, it did save lives. Where in general use, it provided an effective means of limiting smallpox epidemics. However, where it was used by only part of the population, inoculation could increase smallpox incidence. Because of its failure to be taken up as a universal public health measure, and its infectiousness, smallpox inoculation was never a realistic means of eradicating smallpox. Its major role, therefore, was in smoothing the path for vaccination.

Footnotes to Chapter Seven

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2. Ibid., 59-61; Peter Razzell, The Conquest of Smallpox The Impact of Inoculation on Smallpox Mortality in Eighteenth Century Britain Firie, Sussex: Caliban Books, 1977, 140-58.
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9. Smith, Speckled Monster, 67.
10. Callum Brown, The Social History of Religion in Scotland since 1730 London: Methuen, 1987, 90-97.
11. Donald J. Withrington and Ian R. Grant, (eds) The Statistical Account of Scotland 1791-1799 EP Publishing Ltd., 1973-1983, (hereafter OSA) I, General Introduction, xxii.
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15. Scot's Magazine 19, (1757) 74; 20, (1758) 106.

16. Alexander Monro, An Account of the Inoculation of Small Pox in Scotland Edinburgh: Drummond & J. Balfour, 1765, 6.

17. Scot's Magazine 58, (1796) 75.

18. OSA XVIII, Thurso, 170-72, Golspy, 432; IX, Clackmannan, 713; Frank Forbes (ed) MacNeill of Carsky His Estate Journal 1703-1743 Edinburgh: M. MacDonald, 1955, Appendix E, 103.

19. OSA VIII, Glenorchy & Inishail, 115.

20. OSA XVI, Dyke & Moy, 538; XII, Blackford, 87; XIX, Aithsting, 390.

21. OSA XII, Kilmadock or Doune, 499.

22. OSA XVI, Banff, 45n.

23. OSA IX, Buchanan, 195.

24. OSA XVII, Cromarty, 338-39.

25. OSA XII, Balquhidder, 41.

26. OSA XI, Longforgan, 345.

27. OSA VII, Wistoun & Robertoun, 611; III, Galashiels, 688.

28. OSA VI, Largs, 413.

29. OSA VII, Avendale, 6.

30. R. A. Cage, The Scottish Poor Law 1745-1845 Edinburgh: Scottish Academic Press, 1981, 1-90.

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35. OSA III, Southdean, 641, Roxburgh, 624.
36. Samuel Johnston, Journey to the Western Isles (ed. Mary Lascelles) New Haven: Yale University Press, 1971, 71.
37. OSA XIV, Towie, 735.
38. OSA XVIII, Thurso, 169-70.
39. OSA XV, Deer, 100, Auchindoir 20 n; IX, Gargunnock, 371.
40. Murray, Inoculation journal and letters, E. 777/144/8 (3); John McLagan, Letters on Inoculation, E788.11, Forfeited Estates Papers.
41. OSA VI, Kilwinning, 342.
42. OSA XII, Callander, 188.
43. OSA X, Aberdour, 25.
44. OSA XIX, Tingwall, 480.
45. OSA XIX, Mid & South Yell, 542-43.
46. OSA XVII, Inverness, 83-84; XVII, Applecross, 291.
47. OSA XIX, Aithsting & Sansting, 389.
48. OSA XX, Harris, 92, North Uist, 112, Kilfinichen, 284; VII, Renfrew, 864; III, Peebles, 873; X Crail, 173, Leuchars, 615.

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49. Margaret Mackay (ed.) The Reverend John Walker's Report on the Hebrides of 1764 and 1771 Edinburgh: John Donald Publishers, 1980, 197.
50. Ibid., 59.
51. OSA XIX, Walls and Sandness, 521.
52. Walker, Report on the Hebrides, 86, 183.
53. OSA XIX, Northmaven, 469.
54. OSA XIX, Mid & South Yell, 542.
55. OSA XIX, Bressay, Burra & Quarff, 393.
56. OSA III, Peebles, 873; Jedburgh, 486; XIX, Tingwall, 480, Aithsting & Sansting, 389-90; XVII, Applecross, 291.
57. OSA III, Eccles, 155-56.
58. OSA, III, Earlstown, 145.
59. OSA, III, Jedburgh, 486.
60. OSA VIII, Glassary, 102; Killean & Kilchenzie, 239; Killbrandon & Killchattan, 173.
61. OSA IX, Clackmannan, 713.
62. OSA XVII, Kilmuir Wester & Suddy, 450.
63. Scot's Magazine 20, (1758) 106; Monro, Account of Inoculation, 6.
64. A.D. Farr, 'Medical Developments and Religious Belief with special reference to Europe in the eighteenth and nineteenth centuries' Ph.D. thesis, Open University, 1977, 2-99; Henry Thomas Buckle, On Scotland and the Scotch Intellect H.J. Hanham ed., Chicago: University of Chicago Press, 1970, 204-215; D. W. Bebbington, Evangelicalism in Modern Britain A History from the 1730s to the 1980s London: Unwin Hyman, 1989, 55-57.
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66. OSA XVI, Banff, 44.
 67. OSA XVI, Mortlach, 335.
 68. OSA XIII, Auchterhouse, 51-52n.
 69. OSA XVII, Tarbat, 647, Urquart, 263, Kiltearn, 469.
 70. OSA XVII, Urray, 678n.
 71. OSA XIV, Tough, 729-30.
 72. OSA XVI, Auldearn, 718.
 73. OSA XVI, Dyke & Moy, 538.
 74. OSA XVI, Banff, 44.
 75. OSA XIV, Nigg, 216; Banchory-Davenick, 21.
 76. OSA XIII, Auchterhouse, 51-52n.
 77. OSA XIII, Dunnichen, 210.
 78. OSA XIII, Kirkden, 344.
 79. OSA III, Bowden 375, Castletown 384.
 80. OSA V, Kirkmabreck, 229.
 81. Razzell, Conquest of Smallpox, 52.
 82. Reid Stewart, "The Development of the Voluntary Principle and Practice in Scotland" Ph.D. thesis, Edinburgh University, 1976, 136-76, 322-28.
 83. OSA VII, Greenock, 715.
 84. OSA VII, Innerkip, 743.
 85. OSA VII, Cathcart, 631-2n.
 86. OSA VII, Eaglesham, 638.
 87. OSA VII, Stonehouse, 584-85.
 88. OSA VII, East Kilbride, 414.

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89. OSA VII, Carmunnock, 172.
 90. OSA VI, Symington, 634; Kilwinning, 341.
 91. OSA VI, Kilwinning, 341.
 92. OSA VIII, Kilfinan, 210-11n
 93. OSA VIII, Morven, 373.
 94. OSA V, Kirkpatrick-Irongray, 252.
 95. OSA VIII, Kilninver & Kilmelfort, 289n.
 96. OSA III, Innerleithen, 765.
 97. OSA XVII, Kilmalie, 117.
 98. OSA XIII, Edzell, 217.
 99. OSA XIII, Forfar, 263.
 100. OSA X, Leuchars 615.
 101. OSA X, Newburgh, 664.
 102. OSA XV, Rathen, 472.
 103. OSA XIX, Mid and South Yell, 541-42.
 104. OSA V, Newabbey, 280. See also Eyemouth, Mordington, Jedburgh, Tweedsmuir, Dornock.
 105. OSA III, Eccles, 155.
 106. OSA XI, Tulliallan, 616; XVII, Inverness, 83, Glensheil, 407; XV, Rathen, 472.
 107. OSA XII, Weem, 804.
 108. OSA XVII, Rosemarkie, 599.
 109. OSA XX, Duirinish 161, Portree 194, Snizort 215, Strath 224.
 110. OSA XVII, Applecross, 291.

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111. OSA XV, Rayne, 480-81.
112. OSA XX, Cimbraes, 448; IV, Torthorwald, 508-509.
113. Flinn, Scottish Population History, Appendix A, 486-7.
114. Old Parochial Records, Cleish, 1745-1789, 460/1; Kettins, 1751-1806, 294/5; Fordoun 1791-1819, 259/4; Elie, 1735-1760, 427/1; Anstruther Easter, 1747-1798, 402/2; Logie, 1761-1796, 374/4, General Register Office for Scotland.
115. Rosalind Mitchison, 'Death in Tranent 1754-81' Transactions of the East Lothian Antiquarian and Field Naturalist Society 16, (1979) 37-48; Old Parochial Records, Kilmarnock, 1728-1763, 597/6; Cathcart, 1746-1815 560/1, General Register Office for Scotland.
116. Scottish Population History, 14.
117. Scottish Population History 17.
118. OSA IV, Sanquar, 471.
119. OSA XX, North Uist, 112.
120. OSA V, Kirkmabreck, 229-30.
121. Answer to sixth and seventh questions, Additional Questions to the 1811 Census, British Museum Additional Manuscript 6897.
122. Robert Watt, An Inquiry into the Relative Mortality of the Principal Diseases of Children Glasgow: John Thomson, 1888.
123. Scottish Population History, 303, 390-93.

Conclusion

Inoculation cannot be dismissed as a footnote to the history of eighteenth century medicine. Although it had a relatively brief history - it was practiced for just over a hundred years - inoculation holds an important place as the first form of preventive medicine. Where it proved popular, the procedure was effective in controlling outbreaks of smallpox. However, inoculation never fulfilled early hopes that it might eradicate the disease entirely; over the country as a whole, it was never popular enough to have more than a minor effect on the incidence of smallpox. In terms of reducing mortality, perhaps the most significant effect of inoculation was to open up a whole new avenue of preventative medicine. Without inoculation, vaccination would in all likelihood not have been developed in 1796, and certainly would not have enjoyed such rapid success.

Inoculation is not just important in itself - a study of the extensive literature on the practice reveals much about eighteenth century medicine, reflecting major changes in medical practice and the profession. The steady growth in its popularity, though exaggerated by the very low numbers inoculated during the early decades, reflected the general increase in the demand for medical care. During the eighteenth century, medical practitioners were employed by an ever growing proportion of the population. Similarly, the move to provide inoculation free of charge through institutions was an aspect of the new interest in public health care. HOspitals, dispensaries and charitable societies providing free inoculation used the same mercantilist arguments to appeal for funds as institutions

offering care to the sick poor. They shared the same organisational structure and drew their staff from the same circles of young practitioners.

The history of inoculation also reveals upheavals within the medical profession. Initially, the procedure was divided between physicians and surgeons according to the old tripartite division of practice with the elite physicians, who had introduced from the Near East and persuaded the British medical profession to adopt it, keeping overall control of the process. However, the physicians' authority as the elite of the medical profession was already being eroded. Within thirty years, their monopoly of inoculation had gone, as rank and file practitioners responded to the new demand for inoculation by undertaking all aspects of the procedure. One of the strategies employed by the physicians to retain their position was to accuse their competitors of 'quackery' and by implication, irrational and dangerous practice, reflecting the fine line between regular and irregular practitioners in the eighteenth century marketplace.

The history of inoculation also challenges our ideas about the eighteenth century medical revolution. Historians have tended to associate fundamental change in medical practice with hospitals and dispensaries created in the second half of the century. In these new institutions, confronted by large numbers of poor patients, practitioners gradually abandoned humoral theories and built a 'new medicine' which located disease in body organs. Instead of regarding each patient as a unique complex conjunction of disease and environment requiring an individual programme of therapy, practitioners began to use the same treatment for all patients suffering from the same condition.

However, inoculation suggests that the creation of routinised methods was a much more gradual process which began as early as the 1720s. In the early decades of the eighteenth century, physicians were not content to rely upon classical learning. Inoculation was part of a drive to improve and advance medical knowledge and medical care, long before the advent of institutions. At first, inoculation was integrated with established theory and practice, with all patients undergoing a period of preparation tailored to their individual needs. However, by the 1750s, in inoculation as in the treatment of smallpox, practitioners developed much simpler set practices; they used a small repertoire of drugs, applied at particular times, and often recommended the precise composition and even the doses to be used. This reached its apogee in the Suttonian method. All the Sutton's patients received set amounts of the same medicines, and followed the same diet. It was this method, developed in private practice, which allowed the institutionalised provision of inoculation.

The controversies over inoculation also provide an insight into the sad decline of the old medical elite. In other histories, the physicians seem to quietly fade away to be replaced by a new generation of practitioners. However, their departure from the medical scene was anything but peaceful. Much of the physicians' problems seems almost self-inflicted. While they were eager to innovate, their status remained bound up with an increasingly archaic style of medical practice which seemed. The history of inoculation is largely a history of their struggles to reconcile these two contradictory realities. Thus the physicians defended their monopoly of inoculation, and later their status as authorities on the procedure by harking back to the need

for individualised treatment. Consequently, they appealed only to a small group of rich clients, leaving the surgeons and apothecaries to take advantage of the growing demand for inoculation.

Appendix ILondon Bills of Mortality

Taken from William Guy, 'Two Hundred Years of Smallpox in London'
Journal of the Statistical Society 45, (1882) 431-32.

Year	Deaths	Smallpox deaths	% of total deaths	average % per 5 yrs
1701	20471	1095	5.35	
1702	19481	311	1.60	
1703	20720	898	4.33	
1704	22684	1501	6.62	
1705	22097	1095	4.96	4.57
1706	19847	721	3.63	
1707	21600	1078	4.99	
1708	21291	1687	7.92	
1709	21800	1024	4.70	
1710	24620	3138	12.74	6.80
1711	19833	915	4.61	
1712	21198	1943	9.16	
1713	21057	1614	7.66	
1714	26569	2810	10.58	
1715	22232	1057	4.75	7.35
1716	24436	2427	9.93	
1717	23446	2211	9.43	
1718	26523	1884	7.10	
1719	28347	3229	11.39	
1720	25454	1440	5.66	8.70
1721	26142	2375	9.08	
1722	25750	2167	8.42	
1723	29197	3271	11.20	
1724	25952	1227	4.74	
1725	25523	3188	12.49	9.19

Year	Deaths	Smallpox deaths	% of total deaths	average % per 5 yrs
1726	29647	1519	5.29	
1727	28418	2379	8.37	
1728	27810	2105	7.57	
1729	29722	2849	9.58	
1730	26761	1914	7.15	7.59
1731	25262	2640	10.45	
1732	23358	1197	5.12	
1733	29233	1370	4.69	
1734	26062	2688	10.31	
1735	23538	1594	6.77	7.47
1736	27581	3014	10.93	
1737	27823	2084	7.49	
1738	25825	1590	6.16	
1739	25432	1690	6.64	
1740	30811	2725	8.84	8.01
1741	32169	1977	6.14	
1742	27483	1429	5.20	
1743	25200	2029	8.05	
1744	20606	1633	7.92	
1745	21296	1206	5.66	6.59
1746	28157	3236	11.49	
1747	25494	1380	5.41	
1748	23869	1789	7.49	
1749	25516	2625	10.29	
1750	23727	1229	5.26	7.99
1751	21028	998	4.74	
1752	20485	3538	17.27	
1753	19276	774	4.02	
1754	22696	2359	10.39	
1755	21917	1988	9.07	9.10

Year	Deaths	Smallpox deaths	% of total deaths	average % per 5 yrs
1756	20872	1608	7.70	
1757	21313	3296	15.46	
1758	17576	1273	7.24	
1759	19604	2596	13.24	
1760	19830	2187	11.03	10.93
1761	21063	1525	7.24	
1762	26326	2743	10.42	
1763	26148	3582	13.70	
1764	23202	2382	10.27	
1765	23230	2498	10.75	10.48
1766	23911	2334	9.76	
1767	22612	2188	9.68	
1768	23629	3028	12.81	
1769	21847	1968	9.01	
1770	22434	1986	8.85	10.02
1771	21780	1660	7.62	
1772	26053	3992	15.32	
1773	21656	1039	4.98	
1774	20884	2479	11.87	
1775	20514	2669	13.01	12.16
1776	19048	1728	9.07	
1777	23334	2567	11.00	
1778	20399	1425	6.98	
1779	20420	2493	12.21	
1780	20517	871	4.24	8.70
1781	20709	3500	16.90	
1782	17918	636	3.55	
1783	19029	1550	8.14	
1784	17828	1759	9.87	
1785	18919	1999	10.57	9.81

Year	Deaths	Smallpox deaths	% of total deaths	average % per 5 yrs
1786	20454	1210	5.92	
1787	19349	2418	12.50	
1788	19697	1101	5.59	
1789	20749	2077	10.01	
1790	18038	1617	8.96	9.78
1791	18760	1747	9.31	
1792	20213	1568	7.76	
1793	21749	2382	10.95	
1794	19241	1913	9.94	
1795	21179	1040	4.91	8.57
1796	19288	3548	18.39	
1797	17014	522	3.07	
1798	18155	2337	12.87	
1799	18134	1111	6.13	
1800	23068	2409	10.44	10.18

Appendix IIEdinburgh Bills of MortalityTaken from The Scots Magazine 1739-1776, 1791-1794.

Year	Deaths	Smallpox deaths	% of total deaths	average % per 5 yrs
1739	1051	117	11.1	
1740	1240	274	22.2	
1741	1619	206	12.6	
1742	1345	167	12.5	
1743	1379	249	18.2	
1744	1309	176	13.5	
1745*	1463	141	9.6	13.2
1746	1712	128	7.5	
1747	1200	71	5.9	
1748	1186	167	14.1	
1749	1132	192	16.9	
1750	1038	64	6.2	10.1
1751	1241	109	8.8	
1752	1187	147	12.3	
1753	1105	70	6.3	
1754	1215	104	8.5	
1755	1187	89	7.5	8.7
1756	919	126	13.7	
1757	1267	113	8.9	
1758	1001	52	5.2	
1759	1136	232	20.4	
1760	1123	66	5.9	10.8
1761	903	12	1.3	
1762	1305	274	20.8	
1763	1160	123	10.6	
1764	1037	6	0.6	
1765	1250	239	19.2	10.5

* The number of deaths for 1745 and 1746 are inflated with soldiers buried in Edinburgh after the battle of Prestonpans during the Jacobite Rising.

Year	Deaths	Smallpox deaths	% of total deaths	average % per 5 yrs	
1766	1051	116		11.0	
1767	1065	115		10.8	
1768	925	110		11.9	
1769	1105	235		21.3	
1770	1235	69		5.6	12.1
1771	1214	97		8.0	
1772	1181	226		19.1	
1773	1107	127		11.5	
1774	1351	199		14.7	
1775	1114	89		8.0	12.3
1776	1111	199		17.9	
1791	2592	343		13.2 ¹	
1792	2023	232		11.4	
1793	1738	267		15.3 ²	
1794	835	263		31.5	

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1. Westkirk, Canongate, Calton churchyards
 2. Greyfriars, West, Canongate, Calton burial grounds.
- The totals for 1793 & 1794 are incomplete.

Appendix III

Table of Inoculation, 1765

Alexander Monro, Account of Inoculation in Scotland Edinburgh: Drummond & J. Balfour, 1765, 27-29
 Special Collections, Edinburgh University, G 18.59

Correspondents.	Residence.	Recov- ered.	Dist.
The physicians and surgeons of	Edinburgh and Leith	793	10=78
Mess. William Hutchinson John Cunningham Calderwood	Dalkeith	52	1
Mr Thomas Dallas	Musselburgh	14	
Mr Archibald Scot		12	
Mr John Forrest	Tranent	16	1
Mr Charles Macky	Ormiston	28	
Dr James Lundie	Haddington	100	2
Mr James Hamilton	Dunbar	38	
Dr William Calderfon	Berwick	29	
Mr James Wood		21	
Dr John Millar		34	1
Dr Ormiston	Kelso	6	
Mr Thomas Davidson		9	
Dr Robert Mercer	Selkirk	24	
Mr William Laing		17	
Mr Thomas Rutberford	Jedburgh	7	
Mr William Scott	Hawick	31	
Mr John Duofs	Langholm	8	
Dr George Grieve	Peebles	2	
Dr James Hunter	Moffat	70	
Dr Ebenezer Gilchrist	Dunfermline	500	9
Dr Alexander Campbell	Ayr	75	2
Dr Jasper Tough	Kilmarnock	24	
Dr John Cumming	Irvine	260	1
Mr Lachlan Campbell	Campbelton	65	1
Mr James Flint		150	2
Mr Swan	Dumbarton	59	
Mr Alexander Molifon	Port Glas-	95	1
Mr H. Maclean	gow	5	1
Mr Nathaniel Wilson	Greenock	15	
D 2	Carried forward,	2529	32

Correspondents.	Residence.	Recov- ered.	Dist.
	Brought forward,	2529	32
Mr Graham	Paisley	17	
Mr Gilbert Lauson		12	1
Dr John Gordon		200	
Mr John Moore		64	2
Mr Thomas Hamilton		50	
Mr Robert Wallace	Glasgow	32	
Mr Ninian Hill		50	
Mess. Maxwell & Parlant		60	2
Mr John Crawford		300	1
Mr James Muir		200	2
Dr John Cook	Hamilton	13	
Mr William Leckie	Broich	16	
Dr Walter Stirling	Stirling	208	
Mr James Oughterson	Falkirk	38	1
Mr Robert Kirkland	Gogar	85	1
Mr Robert Spotwood	Cramond	5	
Dr James Smith	Borrow-	12	
Mess. Glasford & Clerk	Stouness	5	
Dr John Stedman	Dunferm-	48	
Mr William Gulland	line	5	
Mr William Stenhouse		20	1
Dr Henry Miller	Kirkaldy	42	
Dr Thomas Simson	St Andrew's	42	4
Dr George Bethune		11	
Rigg	Coupar of	5	
Robert Menzies	Fife	30	1
Mr James Paterson	Carpow	4	1
Dr Robert Wood		73	
Mr Neil Menzies		8	1
Mr Patrick Nisbet	Perth	19	1
Davidson		2	
	Carried forward,	4205	51

* My ingenious friend Dr Alexander Stevens physician in Glasgow, to whom I am obliged for collecting the lists and observations sent me from that city, and the towns in its neighbourhood, had always surgeons employed when he attended inoculated patients, who are all in the lists sent by the surgeons, and therefore his name could not be inserted in the table.

Correspondents.	Residence.	Recov- ered.	Dist.
	Brought forward,	4205	51
Mr Lindesay	Grief	6	
Mr James Spence	Dunkeld	15	
Dr Ogilvie	Forfar	30	
Mr John Stevenson	Arbroath	30	
Dr John Mudie		7	
Dr Aikman	Montrose	3	
Dr Alexander Rose		49	3
Dr Thomas Livingston		28	1
Dr Forbes	Aberdeen	10	
Dr Burnet		9	
Dr Andrew Skene		31	
Dr David Skene		30	
Dr James Saunders	Banff	310	1
Dr Seton	Fraser-	17	
Dr Finlay	burgh	5	
Mr David Brodie	Elgin	2	
Mr Forbes	Nairn	8	
Dr John Alves		25	1
Mr Alexander Munro	Inverness	10	
Mr John Maclean	Sky	188	10
Mr Neil Beton	Dingwall	10	
Mr Hew Macfarquhar	Tain	23	
Dr Alex. Mackenzie	Milnmount	55	
Mr Alex. Mackenzie	Dornoch	127	1
Dr William Sinclair	Thurso	245	3
Dr Hew Sutherland	Orkney	60	1
Mr John Giffard	Shedand	16	
	Total,	5554	72=78

* My worthy friend Dr Sutherland unluckily died before I began this inquiry. The number I have put to his name I am certain of by the information received from Mr Mackenzie of Dornoch, who was his assistant when he first began this operation; but in another letter, the authority of which I cannot so much rely on, it is asserted, that Dr Sutherland inoculated 600, of which only one died; but whether this, inoculated in the north isles by Mr Mackenzie, are included in this number, I cannot determine.

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Appendix IVInoculation in Scotland, 1765

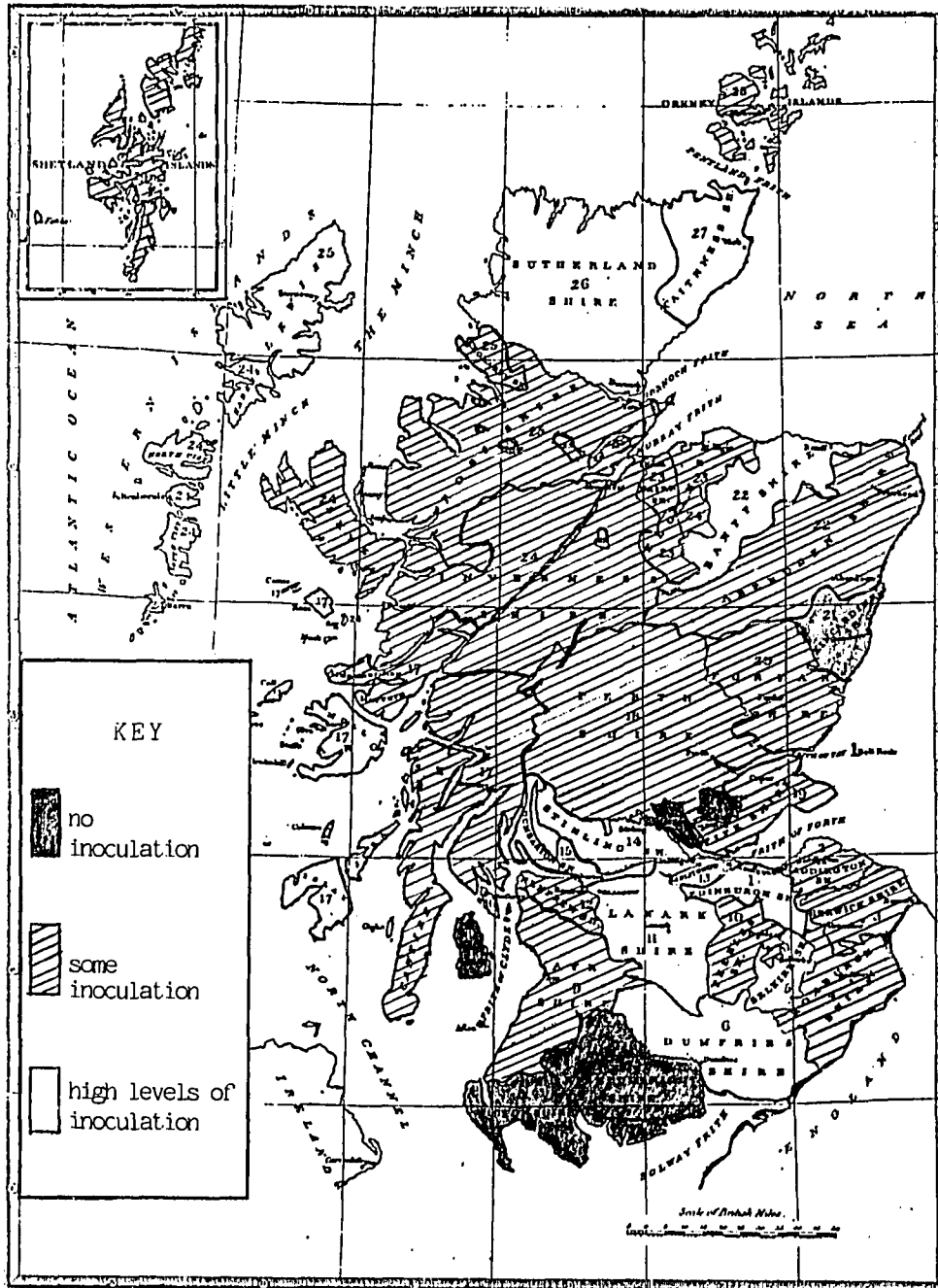
(from Alexander Monro, The Account of Inoculation in Scotland Edinburgh: Drummond & J. Balfour 1765, 27-29.)

County	Population	Number inoculated	Ratio of inoculated
Dumfries	41244	683	1:60
Dumbarton	14364	233	1:62
Lanark	84716	969	1:87
Caithness	23028	245	1:94
Edinburgh	93719	866	1:108
Banff	39866	310	1:129
Stirling	38368	246	1:156
Linlithgow	17445	107	1:163
Sutherland	21534	127	1:170
Selkirk	4168	24	1:174
Haddington	30796	142	1:217
Renfrew	27620	115	1:240
Inverness	61742	223	1:277
Berwick	24864	88	1:282
Roxburgh	35974	104	1:346
Orkney	24236	60	1:404
Fife	84554	203	1:416
Ayr	61168	99	1:618
Nairn	5902	8	1:738
Shetland	15766	16	1:985
Perth	124510	123	1:1012
Forfar	71403	70	1:1020
Argyll	68711	65	1:1057
Ross & Cromarty	49843	33	1:1510
Peebles	9234	2	1:4617
Elgin	31724	2	1:15862
Bute	10141	---	----

County	Population	Number inoculated	Ratio of inoculated
Clackmannan	12814	---	----
Kincardine	32817	---	----
Kinross	6958	---	----
Kirkcudb't	30181	---	----
Wigtown	17168	---	----
Total pop.	1311669	5554	1:236
Total under 10	309115	5554	1:56

Appendix V

Distribution of Inoculation in Scotland, 1765



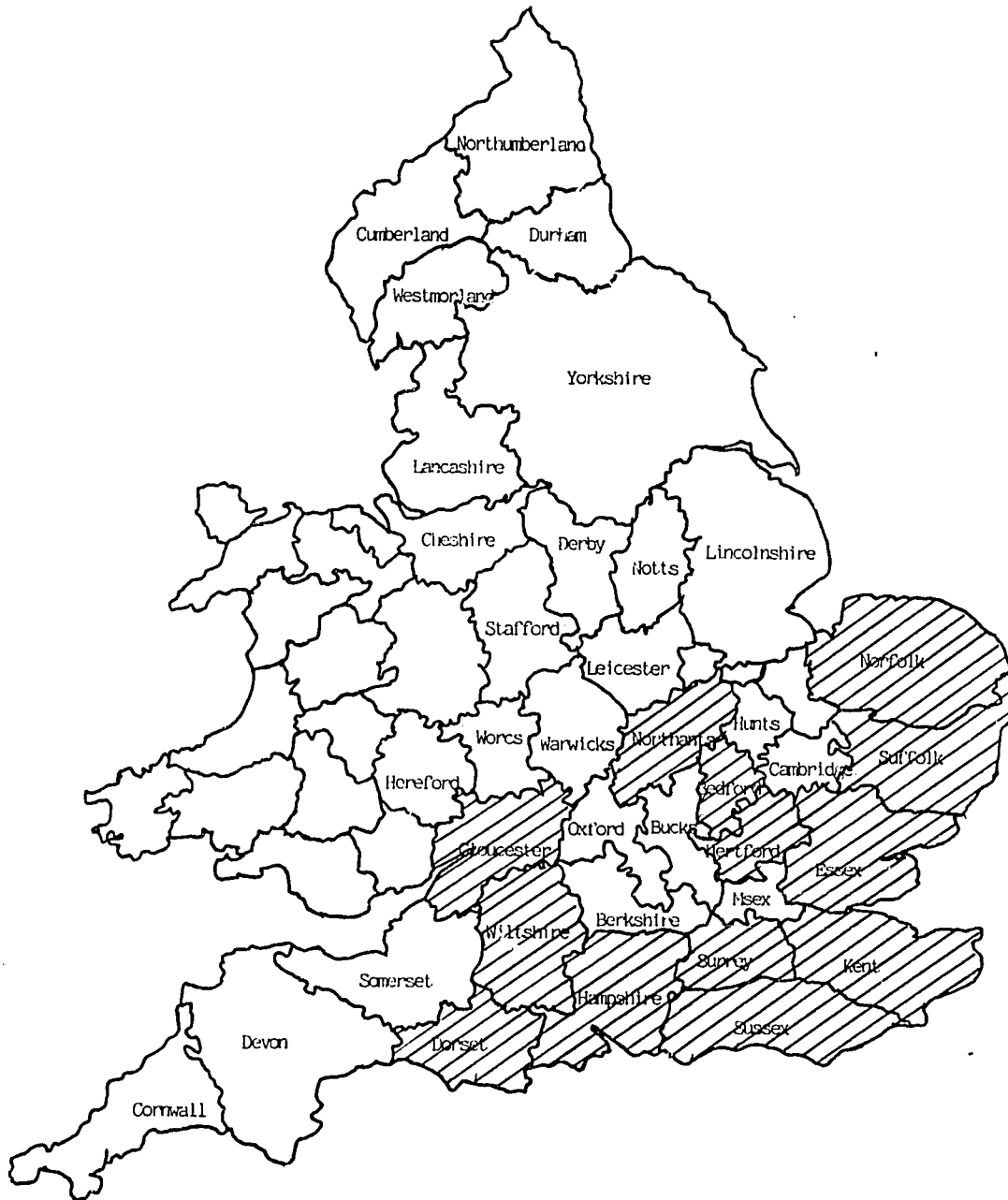
Appendix VIGeneral Inoculations in England to 1799

Date	Place	Paid by Poor Relief	Total inoculated
1766	Blandford, Essex	150	384
	Maldon, Essex	417	487
	Ewell, Surrey		249
	Maidstone, Kent		'several hundred'
	Hertford, Herts.		
1767	Glynde, Sussex	c.40	
	Lewes, Sussex		
	Rye, Sussex	329	
1770	Hertford, Herts.		250+
1772	Newport, Essex	136	270
1773	Mistley, Essex		
1774	Hertford, Herts.	120	
	Southampton, Hants.,		
1777	Ware, Herts.		1000
1778	Bedford, Beds.	1100	
	Hadleigh, Suffolk		
	Irthingborough, Northants.	500+	
	Oundle, Northants.		
	Southampton, Hants.,		
	Witham, Essex	1000+	
1779	Great Chisall, Essex		
	Maldon, Essex	c.1000	
1780	Beaminster, Dorset		
1781	Leeds, Yorkshire		385
	Liverpool, Lancs.	417	517+
1782	Liverpool, Lancs.		
1784	Arlingham, Gloucs.		
	Diss, Norfolk	1100	
1785	Great Warley, Essex		
	Painswick, Gloucs.		738
1786	Brighton, Sussex	1887	
	Luton, Beds.	928	1215
1787	Rawreth, Essex		

Date	Place	Paid by Poor relief	Total inoculated
1788	Leeds, Yorkshire	80	
	Maldon, Essex		
	Northwold, Northants	226	300
	Weston, Norfolk		
1791	Beaminster, Dorset	379	
1792	Rawreth, Essex		
1793	Calne, Wilts.	600+	800+
1794	Brighton, Sussex	2113	
	Hevingham, Norfolk		226
	Lewes, Sussex	2890	
1795	Berkeley, Gloucs.		
	Tortworth, Gloucs.		
1797	Dursley, Gloucs.	1475	
	Leyton, Essex	83	
	Maldon, Essex		
	Woodham Ferrers, Essex	20	
1798	Leyton, Essex		
	Tenterden, Kent	1167	
1799	Canewdon, Essex		
	South Benfleet, Essex		
	East Ham, Essex	70	

Appendix VII

Distribution of General Inoculations in England



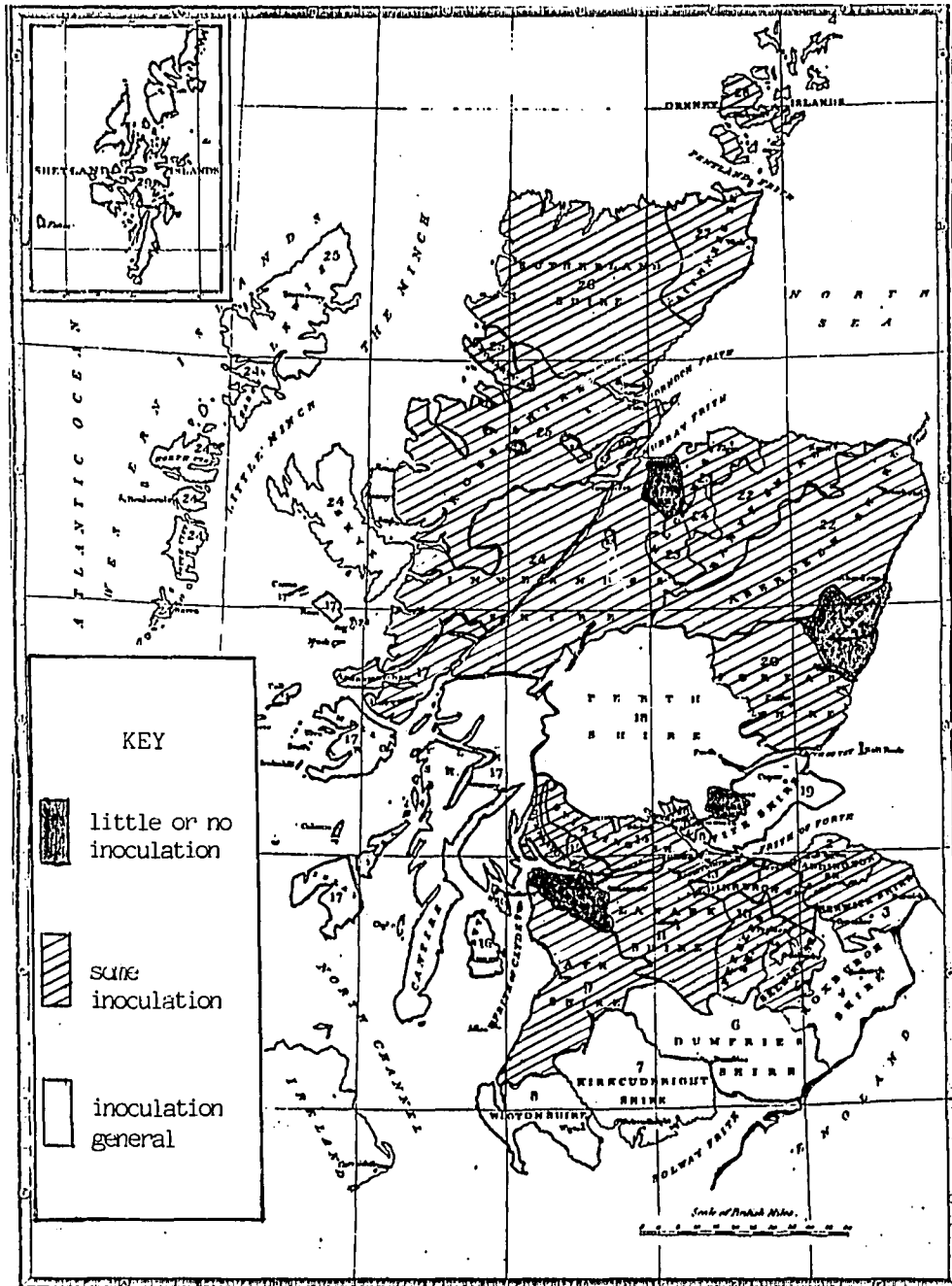
Appendix VIII

General Inoculation around Crieff
(From J. Stobie, The Counties of Perth and Clackmannan, 1783.



Appendix IX

Distribution of Inoculation in Scotland, 1790s



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