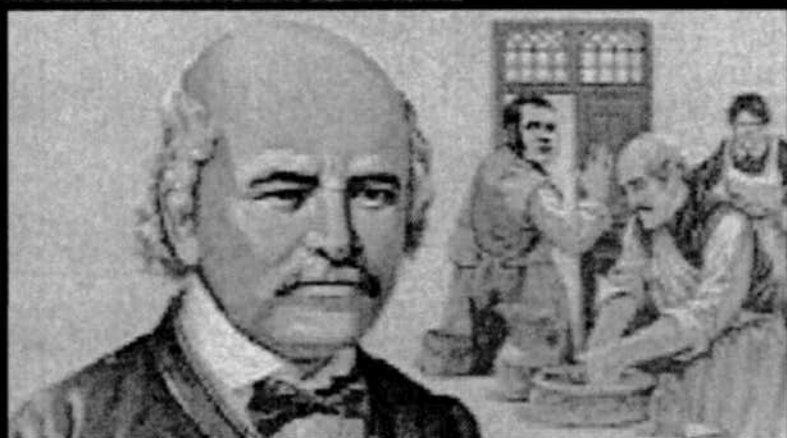


With a new introduction by the author
K. Codell Carter
Barbara R. Carter



Childbed Fever

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CHILDBED FEVER

A Scientific Biography of Ignaz Semmelweis
K. Codell Carter and Barbara R. Carter

With a new introduction by the authors

The life and work of Ignaz Semmelweis is among the most engaging and moving stories in the history of science. *Childbed Fever* makes the Semmelweis story available to a general audience, while placing his life, and his discovery, in the context of his times.

In 1846 Vienna, as what would now be called a head resident of obstetrics, Semmelweis confronted the terrible reality of childbed fever, which killed prodigious numbers of women throughout Europe and America. In May 1847 Semmelweis was struck by the realization that, in his clinic, these women had probably been infected by the decaying remains of human tissue. He believed that infection occurred because medical personnel did not wash their hands thoroughly after conducting autopsies in the morgue. He immediately began requiring everyone working in his clinic to wash their hands in a chlorine solution. The mortality rate fell to about one percent.

While everyone at the time rejected his account of the cause of the disease because his theory was fundamentally inconsistent with existing medical beliefs about how diseases were transmitted, in time Semmelweis was proven to be correct. His work led to the adoption of a new way of thinking about disease, thus helping to create an entirely new theory—the etiological standpoint—that still dominates medicine today.

"This delightful, clearly written little book is not so much the biography of a man as the biography of a disease: puerperal fever."—*Journal of the American Medical Association*

"[T]here is much that is new and stimulating in this short biography of one of the most complex and puzzling of all the famous doctors of the nineteenth century. It is well worth reading, for Semmelweis is a much more interesting study than the cardboard saint of the standard biographies."—*Bulletin for the History of Medicine*

About the Authors

K. Codell Carter teaches philosophy at Brigham Young University. He has edited Semmelweis's writings and published on other historical figures in the history of medicine. His most recent work is *The Rise of Causal Concepts of Disease*.

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A Scientific Biography of Ignaz Semmelweis



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Transaction Introduction

We know of no story more engaging and moving than the life and work of Ignaz Semmelweis. In writing this book, our goal was to make the Semmelweis story available to a general audience; unfortunately the book appeared only in an expensive library edition. During the decade since its first publication, hoping to bring the story to more readers, we considered publishing the book, privately, in an inexpensive paperback format. Now, because Transaction Publishers has kindly invited us to reissue the book, we have new hope that our goal may yet be attained.

Parts of Semmelweis's story have been told before. His work is the subject of more than the usual number of scholarly books and articles. Morton Thompson's 1949 fictionalized account of his life and work, *The Cry and the Covenant*, sold over a million copies. Sherwin B. Nuland's *The Doctors' Plague: Germs, Childbed Fever, and the Strange Story of Ignác Semmelweis* appeared in 2003. However, few authors have made the necessary effort to understand (much less to explain) the system of ideas to which Semmelweis was drawn. As a result, while the pathos of Semmelweis's life comes through in virtually every account, almost no one, not even Nuland, grasps Semmelweis's significance in the history of medicine. We find our book to be better written and more engaging than any of the other accounts, but an even more important virtue is that it alone makes clear exactly why Semmelweis was so important. His contribution was different from and more profound than one would infer from any other published account of his life and work.

In 1846 Vienna, as what would now be called a head resident of obstetrics, Semmelweis confronted the terrible reality of childbed fever. This disease struck post partum women within twenty-four to forty-eight hours after delivery and killed prodigious numbers of women throughout Europe and America. In some maternity clinics, through several decades, the mortality rate exceeded twenty percent. In some hospitals, over a period of weeks, epidemics of childbed fever killed seventy percent or more of all the women who gave birth. In Vienna, the mortality rate averaged a relatively benign ten percent, but even at that comparatively low rate, more than 2000 women died each year from the disease. All told, in nineteenth-century Europe, childbed fever killed more than a million women.

In May 1847, Semmelweis was struck by the realization that the diseased women in his clinic had all been infected by decaying remains of human tissues. Infection occurred because medical personnel did not wash their hands thoroughly after conducting autopsies in the morgue. He immediately began requiring everyone working in his clinic to wash in a chlorine solution. The mortality rate immediately fell to about one percent. Over the next two years, Semmelweis refined his understanding of childbed fever and accumulated impressive statistical evidence in support of his views. By 1850 he was convinced that *every* case of childbed fever was due to what he described as the resorption of decaying organic matter.

While some of Semmelweis's contemporaries were willing to try chlorine washings, at the time everyone rejected his claim that every case of childbed fever was due to one universal necessary cause. The idea that every case of any disease would have a single universal cause was fundamentally inconsistent with existing medical beliefs, and even his teachers and supposed friends in the Vienna medical school balked at this radical claim.

Within ten years, Semmelweis died after being beaten by the guards of an insane asylum to which he had been committed. By

the time of his death, only a few physicians had accepted his account of childbed fever. However, in time his views prevailed. Within about two decades, several prominent researchers acknowledged that Semmelweis had helped provide a true understanding of childbed fever and, ultimately, of infectious diseases generally.

Semmelweis's claims were starkly inconsistent with medical theories current in the 1850s; understandably, this made his claims difficult to accept. However, by forcing physicians to abandon their cherished theories, his work led to the adoption of an entirely new way of thinking about disease. Thus, he did not simply contribute a beneficial new practice (disinfectant washings); rather he helped create an entirely new theory of disease. This new theory, sometimes referred to as the etiological standpoint, still dominates medicine today. Failure to grasp the relation between Semmelweis's work and the rise of the etiological standpoint is the main defect in the standard accounts of Semmelweis's life and work.

We are delighted to have yet another opportunity to make this clear.

Finally, we would like to comment on the title of this book. The title we originally chose was *Houses of Death: An Account of Childbed Fever and of the Work of Ignaz Semmelweis*. This title was suggested by a story that is narrated in the first paragraph of the Preface (to which the reader is invited to turn). However, the initial publisher found the title too dramatic, and Transaction Publishers has elected to retain the title under which the book was originally published. As authors, we still judge our originally intended title to best reflect the content and the tone of the book.

K. Codell Carter
Barbara R. Carter

Preface

A nineteenth-century medical student overheard a senior physician say that charity maternity clinics—birth houses, as they were called—were really houses of death. He was surprised by the comment and asked a hospital worker why the physician would say such a thing. “It’s obvious,” the worker replied; “the morgue is always full of corpses from the maternity wards, like fish on a slab.”¹

Medical advances are purchased by two kinds of sacrifice: the sacrifice of researchers trying to understand disease and the sacrifice of patients who die or are killed in the process. One striking nineteenth-century medical advance was the recognition that microorganisms cause disease. This particular advance was purchased, in part, by the sacrifice of hundreds of thousands of young women who died, following childbirth, of a terrible disease known as childbed fever—a disease that was rampant in the charity maternity clinics of the early nineteenth century.

In 1847 a young Hungarian obstetrician, Ignaz Semmelweis, discovered how the incidence of childbed fever could be significantly reduced. However, Semmelweis interpreted his discovery in a way that was inconsistent with contemporary medical doctrine, and his ideas were ridiculed and rejected by his fellow physicians. Eighteen years passed; each year, while the doctors argued, thousands more women perished in maternity clinics throughout Europe. Then, at the age of forty-two, Semmelweis died in a Viennese insane asylum after having been severely beaten by the asylum guards. In the same year, an Austrian obstetrician named Carl Mayrhofer

published an essay in which he argued that childbed fever was invariably caused by microorganisms. This discovery, which was based partly on Semmelweis's work, was also rejected by many prominent obstetricians. However, a few physicians were persuaded by the evidence, and slowly the truth prevailed.

The moving and pathetic story of Ignaz Semmelweis has been told before. Yet his work is not widely known, and few of those who know of his work understand the true nature of his contribution. In writing this book, our purpose is to tell his story in a way that requires no special background in medicine or in medical history. Our hope is that more people will understand Semmelweis's work and comprehend the terrible sacrifices from which our medical system has emerged.

Many friends have helped us prepare this book. For their various contributions, we thank (in alphabetical order) Linda Hunter Adams, Diane and Travis Anderson, Carolyn and Stewart Armour, Nina and Sherman Carter, Helen Dixon, Janice and Jim Faulconer, Kent and Pat Larkin, Valerie Merit, Mark Olsen, Jan and Janice Nelson, Prascilla Hong Mee Park, Karen Pierotti, Dawn Rosquist, Susan Scott, Heather Seferovich, Jim and Julie Siebach, and Marcus Smith. We thank Josef Antall, recently deceased, previously director of the Semmelweis Institute for the History of Medicine and former Prime Minister of Hungary, for numerous enlightening conversations about the life and work of Ignaz Semmelweis. We thank Lajos Madgar for helping us locate and understand various Hungarian texts, and István Benedek for discussing with us the details of Semmelweis's death. We thank the University of Wisconsin Press for permission to use several passages from the translation of Semmelweis's *Etiology of Childbed Fever* (copyright by the Board of Regents of the University of Wisconsin System). Some of these passages have been modified slightly to bring them into accord with the terminology of this book. Two earlier essays, "Semmelweis and His Predecessors" and "Ignaz Semmelweis, Carl Mayrhofer, and the Rise of Germ Theory,"

provided the basis for chapters 3, 4, and 5. These essays, which appeared originally in *Medical History*, are copyrighted by the Trustees of the Wellcome Trust and are used with their permission. Finally, we thank Brigham Young University for years of generous research support that led directly to several earlier publications and, indirectly, to this one as well.

Unless otherwise noted, the translations from all non-English sources are our own.

Wells-Next-the-Sea, Norfolk
March 1993

Note

1. Ignaz Semmelweis, *The Etiology, Concept, and Prophylaxis of Childbed Fever*, ed. and trans. K. Codell Carter (Madison: University of Wisconsin, 1983), p. 215.

Vienna's General Hospital

In the late eighteenth century, the Austrian Hapsburgs ruled an empire that included most of central Europe. It was a time of relative peace and prosperity. After two hundred years of intermittent struggle, Hapsburg armies had finally dislodged the Ottoman Turks from Hungary and were gradually driving them south through the Balkans. Austrian baroque architecture culminated in the rebuilding of the Danube monasteries at Melk, St. Florian, Göttweig, and Kremsmünster; Haydn and Mozart were composing in Vienna; the Enlightenment was under way. Joseph II, the most progressive and rationalistic of all the Hapsburg rulers, turned his attention to domestic problems.

At the end of the eighteenth century, about 250,000 people lived in Vienna. Contemporaries estimated that the population included between two thousand and ten thousand prostitutes and between five hundred and four thousand kept mistresses.¹ Many more thousands of single women barely survived as hod carriers, day laborers, seamstresses, cooks, chambermaids, and washerwomen. In a city never accused of moral austerity, the consequences were abortion and illegitimacy. Unwed mothers accounted for half of the live births²—almost twice the rate of present-day America. Poverty forced most of these women to undergo delivery

in the maternity facilities of the Viennese charity hospitals, where conditions were far from satisfactory. Some charity facilities were open to the public, and the unmarried mothers were exposed to scorn and ridicule from passersby.³ Once out of the hospitals, many indigent women were unable to support their babies, but few charitable institutions would accept and care for the newborn. This led to abandonment and infanticide—practices judged to be both immoral and contrary to the interests of the state. Joseph II attacked these problems by constructing a new hospital that provided free and humane medical care for the indigent.

During Joseph II's reign, the center of Vienna was still enclosed by enormous medieval walls although the fortifications were obsolete and the city was spreading beyond them in all directions. Not far outside the walls, on the northwest edge of the city, was a rambling, one-hundred-year-old poorhouse that was the principal residence for Vienna's orphans, invalids, aged, and infirm. In less than three years, from planning to completion, the poorhouse was rebuilt and expanded into the Viennese General Hospital. The first patients were admitted in August 1784.

The General Hospital, which remains in service today, is a short walk from the center of Vienna and is now surrounded by gray office buildings and apartment houses. However, drawings and paintings made soon after its construction show that it was originally encircled by farms and gardens. Less than a mile north of the hospital, the countryside rises toward Leopoldsberg and Kahlenberg—hills overlooking the city that, since Roman times, have been covered with vineyards and the celebrated Vienna Woods.

The General Hospital occupies a system of buildings that surrounds a dozen large rectangular courtyards arranged like an irregular checkerboard. The courtyards contain gardens, shady trees, walks, and occasional statues of prominent persons who have been associated with Viennese medicine. The hospital buildings are two and three stories high and are contiguous so that personnel

can pass from one building to another without going outside. The buildings are narrow enough that some of the larger rooms overlook courtyards on two sides. Originally, the entire complex was divided in half by an imaginary axis extending straight ahead—almost due north—from the main entrance: the right side of the complex was for women, and the left for men.

The hospital was built to accommodate two thousand patients, and it began operations with a staff of only 20 physicians and 140 attendants.⁴ Attendants worked twenty-four-hour shifts and while on duty slept in the same rooms as their patients.

There were three classes of accommodations: one for the indigent, who paid nothing for their care; and two classes for paying patients, in which better service was provided depending on the amount the patient was prepared to pay. Wealthy patients staying in first-class accommodations had private rooms and could be accompanied and served by their own domestic help. Charity patients occupied large rooms, most of which held about twenty beds; and these patients were expected to perform most of the ordinary housekeeping tasks for themselves.

The insane were located in a separate building called the "Fools' Tower." It more nearly resembles a fortress than a hospital facility. The building is round and five stories high; it has only one entrance. Each floor has twenty-eight cells evenly spaced around the outside wall. Each cell has one narrow window secured originally by iron bars. The circular core of the building contains facilities for attendants, round passageways on each floor providing access to the cells, and a central stairway that connects all five floors. In the eighteenth century, entering or leaving the Fools' Tower required passing through a series of heavy oak doors, each guarded by an attendant.

The idea of constructing large charity hospitals was not unique to the Hapsburgs. During the late eighteenth century, hospitals similar to the Viennese General Hospital were constructed in major cities throughout Europe. In comparison to other European

institutions, however, conditions in Vienna's General Hospital were quite favorable. In 1828, the Hôtel-Dieu in Paris had 1,219 beds, of which 406 were three feet wide and 733 were four feet four inches wide. In the early nineteenth century, the number of patients in the Hôtel-Dieu ranged from two thousand to five thousand; and contemporary observers noted that there were often four, five, or even six patients in a bed.⁵ In the maternity clinic at the Hôtel-Dieu, there were generally three or four patients in each bed. The pregnant and the recently delivered, the diseased and the healthy, prostitutes and married women—all were mixed together indiscriminately in the same beds. By contrast, in the Viennese General Hospital, one patient to a bed was always the rule.

What are diseases? One way to answer this question is by identifying groups of symptoms. Particular diseases can then be distinguished and characterized in terms of these symptoms. This is how diseases were generally thought of in the early nineteenth century. Mumps was a swelling in the throat, and hydrophobia (rabies) an inability to swallow, and phthisis (tuberculosis) a coughing up of blood and pus.

If several cases of a disease occurred at the same time and in the same general area, the disease was said to be "epidemic." The occurrence of an epidemic suggested that the victims may have been subjected to some noxious atmospheric influence. On the other hand, if only a few persons contracted a particular disease, the cases were called "sporadic." Sporadic cases were usually ascribed to some cause that was more or less unique to the patient; these could include heredity or even previous diseases, such as smallpox or syphilis, as well as various occupational hazards or kinds of behavior. For example, in 1825 one British physician identified the following possible causes of sporadic phthisis:

hereditary disposition; . . . certain diseases, such as catarrh, pneumonic inflammation, hoemoptoe, syphilis, scrofula,

smallpox, and measles; particular employments exposing artificers to dust, such as needle-pointers, stone cutters, millers, etc.; or to the fumes of metals or minerals under a confined and unwholesome air; violent passions, exertions, or affections of the mind, as grief, disappointment, anxiety, or close application to study, without using proper exercise; playing much on wind instruments; frequent and excessive debaucheries, late watching, and drinking freely of strong liquors: great evacuations, as diarrhea, diabetes, excessive venery, fluor albus, immoderate discharge of the menstrual flux, and the continuing to suckle too long under a debilitated state; and, lastly, the application of cold, either by too quick a change of apparel, keeping on wet clothes, lying in damp beds, or exposing the body too suddenly to cool air when heated by exercise; in short, by any thing that gives a considerable check to the perspiration.⁶

Most deviations from normal life were regarded as possible causes for sporadic disease. No one entertained the idea that every case of any given disease could be due to one specific cause.

In the early nineteenth century, medical treatment was mostly the same as it had been for centuries. Physicians thought of themselves as part of a continuous and ancient tradition of medical practitioners that extended back to the ancient Romans and Greeks. And indeed most of the techniques in common use had been employed by Greek and Roman physicians more than two thousand years earlier.

Disease was often associated with fever and inflammation, and increased body heat was also observed in robust patients who ate too much. Partly because excess heat seemed to be involved both in overeating and in illness, fever and inflammation were often attacked by trying to remove the excess heat that seemed to result from the immoderate consumption of rich foods. This approach was called the "antiphlogistic regimen"; it included

dietary restrictions, the use of laxatives and emetics, blistering, the application of cooling lotions, and especially bloodletting. By contrast, in other cases, disease seemed to arise because the patient was weak and undernourished or overworked. These cases required the opposite approach. Physicians tried to strengthen the patient by administering tonics and alcohol, by ensuring the consumption of nourishing foods, and by prescribing rest. This strategy was called "supportive treatment."

These commonsense ideas about disease created a practical dilemma. Many of the patients treated in the charity hospitals were undernourished and yet at the same time feverish. Fever called for the antiphlogistic regimen. But malnourished charity patients were often too weak to withstand bloodletting and seemed to require supportive treatment. The usual solution was a compromise: physicians applied supportive treatment until the patient seemed strong enough to withstand antiphlogistic measures. Then red towels were brought out, and blood was drawn. Medical writers often warned that the proper therapy could be selected only by carefully considering the details of each individual case.

Physicians believed illness more often resulted from excessive consumption than from deficiency, and the antiphlogistic regimen was more common than was supportive treatment. Bloodletting was used to treat almost every disease. One British medical text recommended bloodletting for acne, asthma, cancer, cholera, coma, convulsions, diabetes, epilepsy, gangrene, gout, herpes, indigestion, insanity, jaundice, leprosy, ophthalmia, plague, pneumonia, scurvy, smallpox, stroke, tetanus, tuberculosis, and for some one hundred other diseases. Bloodletting was even used to treat most forms of hemorrhaging such as nosebleed, excessive menstruation, or hemorrhoidal bleeding. Before surgery or at the onset of childbirth, blood was removed to prevent inflammation. Before amputation it was customary to remove a quantity of blood equal to the amount believed to circulate in the limb that was to be removed.

To treat or to prevent general or systemic symptoms like fever, blood was drawn by opening major veins or arteries. It was judged most effective to bleed patients while they were sitting upright or standing erect, and blood was often removed until the patient fainted. To treat or to prevent local inflammation, blood was removed locally by abrading or cutting the skin or by applying leeches.

When a leech is applied to some body surface, it punctures the skin with a small tooth and secretes chemicals that prevent blood coagulation. It then consumes about half an ounce of blood and drops off. The application of leeches seemed to be an ideal way to combat inflammation. Leeches were applied to any accessible inflamed body surface, including the interior of the mouth and throat, the vagina, and the rectum. Physicians often reported the simultaneous use of fifty or more leeches on a given patient, and leeches were often used together with other techniques for removing blood. Since leeches were used repeatedly and in the treatment of various diseases, it was possible for the leeches themselves to convey disease. Cases were sometimes reported in which leeches seemed to have communicated syphilis by being used first on persons who had the disease and later on other persons.⁷ When leeches were placed in the mouth, they sometimes worked their way down the throat until they blocked the air passage and the patient suffocated.

Leeches became especially popular in the early nineteenth century. Through the 1830s the French imported about forty million leeches a year for medical purposes, and in the next decade, England imported six million leeches a year from France alone.⁸ Through the early decades of the century, hundreds of millions of leeches were used by physicians throughout Europe.

One typical course of medical treatment began on 13 July 1824. At nine P.M., a French sergeant was stabbed through the chest while engaged in single combat; within minutes he fainted from loss of blood. He was moved to a local hospital where he was

immediately bled twenty ounces to prevent inflammation. During the night he was bled another twenty-four ounces. The chief surgeon arrived early the next morning and bled the patient another ten ounces; during the next fourteen hours he was bled five more times. In the first twenty-four hours of treatment, medical attendants intentionally removed more than half of this patient's normal supply of about ten pints of blood. Bleedings continued over the next several days. By 29 July the wound had become inflamed. The physician applied thirty-two leeches to the most sensitive part of the wound. Over the next three days there were more bleedings and a total of forty more leeches. The sergeant recovered and was discharged on 3 October. His physician wrote that "by the large quantity of blood lost, amounting to 170 ounces [nearly eleven pints], besides that drawn by the application of leeches [perhaps another two pints], the life of the patient was preserved."⁹ By nineteenth-century standards, thirteen pints of blood taken over the space of a month was a large but not an exceptional quantity. The medical literature of the period contains many similar accounts—some successful, some not.

In addition to the antiphlogistic regimen and supportive treatment, physicians prescribed numerous medications. Three especially popular drugs were mercury (usually in a compound called "calomel"), antimony (usually called "emetic tartar"), and arsenic. All three were toxic and were prescribed in potentially lethal doses. Especially in treating life-threatening diseases, physicians believed that administering drugs or removing blood could be effective only when performed on a scale that would itself endanger the life of the patient; such procedures were called "heroic therapies."

Surgical treatment was especially perilous to patients. There was no effective anesthetic; patients were simply tied down, a small block of wood was placed between their teeth, and the surgeon began cutting. The pain and shock of surgical procedures were

often fatal. At the time, no one saw any reason for sterile operating conditions. Surgeons usually worked wearing blood-stained aprons over their ordinary street clothing. Blood encrusted clothing was regarded as a sign of the wide experience of the surgeon. Between operations, instruments were merely rinsed in tap water or not cleaned at all. Some surgeons were offended at the suggestion that they should wash their hands prior to surgery; they felt that their social status as gentlemen was inconsistent with the idea that their hands could be unclean. Surgical incisions were usually packed with common lint and then bandaged. However, at Vienna's General Hospital, the preferred treatment was to cover the incision with wet sponges and then rinse it frequently with cold tap water. As we now know, both procedures were conducive to infection. Not surprisingly, less than half of all surgical patients survived.

After surgery, patients risked catching various diseases. Among the most common was surgical fever—pain, inflammation, and a high temperature. Many patients contracted erysipelas, a painful inflammation that spread rapidly through the skin and subcutaneous tissues. Another problem was blood poisoning, in which the victim's blood seemed itself to degenerate; blood poisoning was classified either as septicemia or as pyemia depending on the amount and kind of pus that appeared in the blood. There was also hospital gangrene, a particularly loathsome disorder in which all the tissues slowly but inevitably decomposed while giving off a noisome and penetrating stench. Finally there was tetanus, a terrible condition characterized by progressively intensifying convulsions and muscle seizures; tetanus was especially rampant among the newborn as well as in battlefield surgeries. Of those who survived the shock and pain of the surgery itself, more than half died from one of these infections. This was true even after surgical procedures that were relatively simple. As a result, surgery of any kind was usually a last resort.

Like other surgical procedures, cesarean sections were hopelessly dangerous and were usually performed only to save a fetus from

a dead or dying mother.¹⁰ The prohibitive dangers of cesarean section had one particularly grim consequence. In the major cities of Europe, most working-class children—perhaps 80 percent or more—were deficient in vitamin D; they nearly all suffered from rickets.¹¹ One early result of rickets is malformation of the pelvis. This usually meant that, when working-class girls became women, they were left with constricted birth canals; for them, vaginal delivery was long and difficult or even impossible. The medical literature contains many cases in which labor extended over several days or in which fetal limbs were torn from the body or the entire body was pulled away from the head in the course of delivery.¹² Sometimes, after days of labor, a dead fetus could be extracted only after it had been cut apart or its skull had been crushed. Such procedures were often fatal to the mother.

Surgery was usually performed in the same room and in the same bed to which the patient had been assigned. Thus, it often took place in large wards filled with other patients, most of whom were themselves either recovering from or awaiting surgery. This increased the opportunity for infection—and the suffering and screams of persons undergoing surgery vividly revealed what was in store for those whose turn had not yet come. In Vienna, partly as a humanitarian measure, the most terrible surgeries were performed in small rooms adjacent to the large surgical wards.¹³

While many medical beliefs and practices had remained almost the same for hundreds of years, there was one respect in which nineteenth-century medicine was changing. Physicians had become interested in the internal alterations associated with certain disease processes. This change in interest can be seen in the history of phthisis—a disease that was prevalent in that period.

In the eighteenth century, phthisis was a common disease. In some populations it accounted for about one-third of all adult deaths.¹⁴ The first symptoms were persistent fever and cough; later, blood and pus were coughed up from the lungs. There was no

effective treatment—victims gradually deteriorated until they died. Phthisis seemed especially common in Vienna, and physicians debated whether it was caused by dust from the busy streets or by the scandalous fast waltzes for which the city was becoming famous.

Until the late eighteenth century, there was little interest in understanding how fever and pus originated in the bodies of patients. The lungs and other internal organs of those who died from phthisis were seldom examined. In general, human cadavers were only rarely opened by physicians. When they were dissected, it was usually only to determine a cause of death or as an aid in the study of anatomy; no one seems to have been much interested in tracing disease symptoms to internal structural changes.

At about the beginning of the nineteenth century, studies by a series of French scientists—especially Gaspard-Laurent Bayle and René-Théophile-Hyacinthe Laennec—revealed that the symptoms of phthisis were associated with particular morbid alterations within the body. Because these internal changes could *explain* the symptoms, they seemed more fundamental than the symptoms themselves; and it appeared more precise and more enlightening to characterize phthisis in terms of the pathological changes, rather than in terms of the symptoms that physicians had long observed. Bayle and Laennec discovered that different internal alterations could cause the same symptoms. As a result, what had been thought of as a single disease—phthisis—was split into a variety of different diseases, depending on the internal changes that produced the symptoms.

Autopsies revealed that many cases of phthisis involved the formation of distinctive tumors or “tubers” in the lungs. Phthisis associated with tubers was distinguished from symptomatically similar cases in which the tubers were absent, and the tuberous disorder was thought of as a separate disease. In time, because the tubers were so characteristic, tuberous phthisis came to be known as tuberculosis.

Because the research in France shed so much light on phthisis and because phthisis was such a prominent disease, these studies became a model for research on other diseases. Physicians dissected corpses, sought morbid anatomical changes, and recharacterized familiar diseases in terms of the changes they were identifying. Such research was known as "pathological anatomy," and it gave physicians a whole new level of understanding: it seemed to provide a scientific basis for medicine. Not surprisingly, pathological anatomy became the main subject of medical research and became increasingly important in training new physicians.

Research and instruction in pathological anatomy depended on the availability of large numbers of human bodies, both diseased and dead. There were several reasons for this. First, to study any given disease, the investigators required access to many patients suffering from that disease. Only by examining many patients could researchers abstract from the peculiarities of individual patients and form a precise concept of the disease symptoms themselves. Second, internal pathological modifications could be identified and correlated with symptoms only by meticulously dissecting many corpses of persons who had died from each disease and by recording and comparing the results of such dissections. This was the only way of distinguishing normal post-mortem changes from the pathological changes that constituted the disease. Third, once a given disease process was understood, ever more patients and corpses were required to demonstrate these discoveries to successive generations of medical students. Fourth and finally, precise comprehension of pathological anatomy required more than lectures and demonstrations; everyone agreed that the subject could be mastered only through firsthand experience in the dissection of corpses, and this called for still more cadavers.

Thus, as pathological anatomy grew ever more central to medical thought, both research and training required access to ever larger numbers of disposable bodies, both living and dead. Where were

these bodies to be found? And how could they be made available to the medical profession?

By the early nineteenth century, charity hospitals like the Viennese General Hospital were operating in most of the major cities of Europe. It seemed reasonable that persons treated in charity institutions should somehow repay society for the free care they received. It seemed especially equitable that this repayment should help advance and disseminate the medical skills from which the charity patients themselves were benefiting. The obvious solution was to use the charity patients as the raw material for medical research and training. Thus, persons admitted to gratis hospitals were expected to serve, as needed, in medical research and to submit themselves for use as teaching specimens in training new physicians. Moreover, it was understood that the hospitals retained control over the corpses of all the charity patients who died there. These corpses thereby became available for dissection by the medical personnel working in the institution.

During its first eighty-eight years of operation, 1.4 million patients were treated in Vienna's General Hospital. This number insured the continuous availability of patients suffering from virtually every common disease. Through these eighty-eight years, the hospital had a mortality rate of approximately 14 percent: about two hundred thousand patients died in the hospital.¹⁵ The mortality rate was high in comparison with modern standards not only because medicine has become relatively more effective, but also because poor persons were regularly taken to the hospitals to die as a way of saving burial costs. The 14 percent mortality rate meant that, on average, the General Hospital morgue received about six new cadavers a day for every day of the year; all were available for dissection.

Thus, by collecting vast numbers of diseased and dying patients, the charity hospitals of Europe controlled precisely the resources deemed necessary for contemporary medical research and training.

Inevitably, the gratis hospitals became centers for the advancement and dissemination of medical knowledge. It is a profound historical coincidence that the interest of physicians was focused on pathological anatomy precisely as the charity hospitals were first making available a virtually unlimited supply of the resources on which that field depended.

Nineteenth-century medical research and training focused on two hospital institutions: the clinic and the morgue. Each clinic was assigned one or more rooms in a gratis hospital, and each such room contained from twenty to one hundred beds. These beds were occupied by patients selected from the general population of the hospital because they presented particularly enlightening cases of specific disorders. Each clinic was directed by a professor who conducted rounds, passing from bed to bed and discussing, in turn, the diseases exhibited by the different patients. The professor was followed by about thirty students. As the professor spoke, the students crowded around each bed, took turns examining the patient, and carefully recorded what they saw and heard. In this way the students learned to recognize the important diseases. This method of medical training, known as the "clinical system," originated in France at the end of the eighteenth century; it proved to be so effective that it was soon adopted throughout Europe.

In 1784 when Vienna's General Hospital began admitting patients, it included various divisions, concerned primarily with caring for the sick, and clinics, intended to train medical professionals. Each clinic specialized in a particular area of medicine depending on the interest of the professor who was in charge. When it opened, the Viennese General Hospital had three clinics, one each for internal medicine, surgery, and obstetrics. During the nineteenth century, more and more clinics were organized until, by the end of the century, there were nearly twenty. The new clinics studied particular kinds of disorders, and this fostered the emergence of medical specialties. Dermatology and ophthalmology were

among the specialties that originated in the clinics of Vienna's General Hospital.

The other center for the study of medicine was the morgue. Here students correlated their clinic observations with internal morbid changes in corpses. Often, the same students who observed the symptoms of a given patient in the clinic would, within a few hours, dissect that patient's corpse in the morgue.

At Vienna's General Hospital, in each of the five years of study leading to a medical degree, students attended lectures both on ordinary gross anatomy and on pathological anatomy. Also as part of their training, students examined wax models, slightly larger than life, that displayed in amazing detail all the various organs and tissue systems of the body. Such models can be seen today in Vienna's medical history museum near the General Hospital. But firsthand dissections were far more enlightening than either lectures or the study of wax models, and medical students regularly spent several hours each day in the morgue dissecting cadavers. Indeed, in Vienna, the medical students spent so much time in the morgue that it became the customary gathering place where they met and passed time when they were not required to be elsewhere.¹⁶ After working in the morgue, many students also carried parts of cadavers to their dwellings for further examination. One physician gave this advice to beginners:

When you dissect, do not attack all the parts of the body at once. The best plan is to take the portion that you are examining to your room, and keep it fresh by plunging it into alcohol. Inspect it with care, and note down your observations. By these means, a head will occupy your time for five or six weeks very advantageously.¹⁷

The rise of pathological anatomy changed how physicians thought about disease. Earlier, individual diseases had been identified as particular collections of symptoms. The pathologists regarded

symptoms as merely superficial manifestations of internal disease processes; whenever possible, they identified diseases as the morbid internal changes that caused the symptoms.

Joseph II, the enlightened Hapsburg innovator, died of phthisis in 1790, six years after the Viennese General Hospital began operation. The next few decades were an exceptionally turbulent period in Europe. In 1793 Joseph's sister, Marie Antoinette, was beheaded in Paris by French revolutionaries. A few years later, Napoleon gained control of France and used its army to force his own ideals on all of Europe. The Hapsburgs sent one army after another to fight the French, but their armies were usually defeated.

These developments completely extinguished the Hapsburgs' interest in innovation: in Austria, the Napoleonic era was a period of deepening conservatism. The Hapsburg monarch who presided over this period of defeat and retrenchment was Francis II, but he himself is remembered less vividly than is his opportunistic and reactionary prime minister, the notorious Clemens von Metternich. Metternich did everything he could to maintain the absolute powers of the Hapsburgs. As a result, he was hated and feared by reformers throughout the empire.

In Vienna, the general political conservatism of the period was reflected in doctrinal conservatism within the medical establishment. In 1806, Valentin von Hildenbrand was appointed professor of internal medicine at the General Hospital and within a few years became director of the entire institution. Hildenbrand championed the ancient notion that disease was caused by noxious atmospheric influences. He also believed that, at any given time, even the cases of different diseases shared a common essence that reflected existing atmospheric conditions. Acting on these beliefs, Hildenbrand observed and recorded various atmospheric factors such as temperature, pressure, relative humidity, and wind velocity. He also made precise records of the incidence of disease and death at the hospital

and sought correlations between the weather conditions and the morbidity.

Because Hildenbrand believed that disease phenomena were mostly dependent on atmospheric factors, he was indifferent to what was happening within the bodies of his patients. However, the general European interest in pathological anatomy made it impossible to ignore the subject altogether, so Hildenbrand and the other physicians at the General Hospital conducted perfunctory autopsies. Under Hildenbrand, the Viennese lacked the confidence and dedication necessary to discover important correlations between case histories and autopsy results. Through the early years of the nineteenth century, the Austrians made only modest contributions to the rising field of pathological anatomy.

Hildenbrand's interest in the atmosphere also made him skeptical of active therapeutic intervention. Following the ancient Hippocratic tradition known as "expectant medicine," he believed that the best treatment was simply to allow patients to recover through their own natural healing processes. Consequently, in comparison to physicians in other European capitals, the Viennese were less aggressive in drawing blood and in administering other heroic therapies. The conservative inaction of Viennese physicians was frequently criticized by other European doctors and sometimes even by the citizens of Vienna, who expected their physicians to do more than merely watch them die.

After Hildenbrand's death in 1818, the physicians at the General Hospital grew progressively more interested in pathological anatomy. In 1821 the first full-time specialist in the field joined the hospital faculty. In 1833 Karl Rokitansky became the hospital's first full professor of pathological anatomy. Rokitansky, who is reputed to have personally dissected more than thirty thousand corpses over the course of his career, ultimately became one of the most important medical researchers ever associated with the Vienna medical school. His numerous careful dissections clearly revealed the correlations between disease symptoms and internal morbid

alterations that earlier Viennese pathologists had sought but seldom found.

Rokitansky collected the strangest and most enlightening of his anatomical specimens and preserved them in large jars filled with alcohol. Today, Rokitansky's macabre collection of morbid anatomical remains—greatly amplified by the contributions of his successors—is open for public inspection at Vienna's General Hospital. It is now displayed in the Fools' Tower, the fantastic round tower built to house the insane. A tour of this museum and an inspection of its contents is not recommended for the fainthearted.

In the years following Rokitansky's appointment as professor of pathological anatomy, several other brilliant young researchers joined the faculty of the General Hospital. Jakob Kolletschka, who had been Rokitansky's student, specialized in forensic pathology. Ferdinand Hebra, the founder of modern dermatology, was the first physician at the General Hospital to specialize in skin diseases. But probably the most important of the young medical scientists at the General Hospital was the internist Josef Skoda. Skoda popularized the use of the stethoscope, which had been invented in France a generation earlier; he also developed percussion as a diagnostic technique. Percussion involved tapping the surfaces of the patient's body and classifying the resulting sounds. Before the discovery of X rays, this technique was the single most useful way of finding out what was happening within a living body. Skoda was able to associate the structural changes identified by Rokitansky with the sounds of percussion and with what he heard through his stethoscope. These associations enabled him to diagnose diseases with amazing speed and accuracy.

Rokitansky, Kolletschka, Hebra, and Skoda brought international fame to the medical school in Vienna. Partly because of their brilliant work and partly because Vienna's General Hospital provided an almost unlimited supply of diseased and dying patients, by the middle of the nineteenth century the hospital had become

the world's foremost research and teaching institution. Physicians and advanced medical students from every part of the civilized world came there to study.

However, not everyone at the General Hospital was enthusiastic about the new work of Rokitansky and his disciples. Some senior faculty members remained faithful to Hildenbrand's view that atmospheric influences were more enlightening than morbid anatomical remains. Disagreement over this theoretical issue was exacerbated by other differences that were more emphatic, if less rational. First, there were the usual jealousies that are provoked on both sides when mediocre but firmly entrenched senior faculty members impede the aspirations of their more talented juniors. Second, there were sharply contrasting political sentiments. Most of the senior physicians were native Austrians and of Germanic extraction; by contrast, many of the brilliant younger physicians—including Skoda, Hebra, and Kolletschka—were from Bohemia or other parts of the Hapsburg empire. On the one hand, contemporary Viennese conservatism made native Austrians mistrust foreigners and their unorthodox ideas. On the other hand, rising nationalism made the Bohemians and Hungarians hostile to their Hapsburg masters and to the conservative native Austrians whom the Hapsburgs seemed invariably to favor. The inevitable result was a fierce power struggle within the Vienna medical school. In the 1840s, the Viennese medical faculty reflected, in miniature, the general nationalistic unrest that was about to convulse the Hapsburg empire as a whole.

Notes

1. Erna Lesky, *Meilensteine der Wiener Medizin* (Vienna: Wilhelm Maudrich, 1981), p. 42.
2. Lesky, p. 34.
3. Lesky, p. 34.
4. Lesky, p. 31.
5. "The Hospitals of Paris," *Lancet* 1 (1828–1829): 262–264.
6. Robert Thomas, *The Modern Practice of Physic*, 8th ed. (London: Longman, 1825), pp. 525 f.
7. "Syphilis Communicated by Leeches," *Lancet* 1 (1828–1829): 14.
8. K. Codell Carter, "On the Decline of Bloodletting in Nineteenth-Century Medicine," *Journal of Psychoanalytic Anthropology* 5 (1982): 219–234.
9. M. Delpech, "Case of a Wound of the Right Carotid Artery," *Lancet* 6 (1825): 210–213.
10. Edward Shorter, *A History of Women's Bodies* (London: Allen Lane, 1983), pp. 160 f.
11. Shorter, pp. 23–26.
12. George W. Balfour, "English and German Midwives," *Lancet* 2 (1855): 503.
13. Dieter Jetter, *Wien von den Anfängen bis um 1900*, vol. 5 of *Geschichte des Hospitals* (Wiesbaden, Germany: Franz Steiner, 1982), p. 51.
14. Robert Koch, "The Etiology of Tuberculosis," in *Essays of Robert Koch*, ed. and trans. K. Codell Carter (Westport, CT: Greenwood, 1987), p. 83.
15. Jetter, p. 28.
16. Gerster, "Das medicinische Wien," *Archiv für physiologische Heilkunde* 6 (1847): 320–329, 468–480, at p. 478.
17. Astley Cooper, "Surgical Lectures," *Lancet* 1 (1823): 1–9, at p. 5.

2

Childbed Fever

The maternity facilities of Vienna's General Hospital were located in the seventh courtyard on the east side of the institution. Originally, the maternity facilities included 178 beds, most of which were allocated to the obstetrical clinic and were available for charity patients. The clinic was responsible for training both obstetricians and midwives.

From 1798 until 1822, Johann Lukas Boer directed the Viennese maternity clinic. Boer's views on childbirth were compatible with Valentine von Hildenbrand's general therapeutic conservatism. Like Hildenbrand, Boer relied on nature rather than on aggressive medical intervention. Boer's attitude was reflected in his cautious use of forceps in delivery. Forceps, which had been invented at the beginning of the eighteenth century, became popular throughout Europe within a few decades. Although the use of metallic forceps increased the likelihood of damaging the tissues of delivering women, many physicians felt that the dangers were justified because forceps could reduce the time spent in labor. Some obstetricians used forceps in half of their deliveries; by contrast, of the nearly thirty thousand births that Boer supervised, forceps were used in just over one hundred cases.¹

Boer did not draw blood from women who were about to deliver; and rather than administering the complex and dangerous drugs that were administered by many of his contemporaries, Boer prescribed nutritious foods, fresh air, and exercise. Hospital regulations required obstetrical students to practice on cadavers, but Boer ignored the regulations and allowed his students to use only fabricated leather models. He was also skeptical of pathological anatomy and did not routinely perform autopsies on women who died in his clinic.

After Hildenbrand died, Boer's disdain for pathological anatomy passed out of favor along with his other antiquated ideas and practices; in 1822 he was forced to resign. Boer was replaced by Johannes Klein, who had been Boer's student and assistant. Klein was an orthodox and unimaginative man. However, he was respected by his contemporaries and was deemed politically safe by the Viennese authorities. Klein immediately resumed the routine practice of performing autopsies, and—as stipulated by hospital regulations—he required his students to practice obstetrical manipulations on cadavers. One physician recorded that Klein's students regularly practiced using both female and fetal corpses so that training exercises would be as realistic as possible. He also observed that Vienna's General Hospital was probably the only facility in Europe with sufficient corpses to provide training of this kind.²

The original 178 beds in the maternity facility soon proved inadequate. In 1834, two new courtyards—referred to as the "eighth courtyard" and the "ninth courtyard"—were added to expand the maternity accommodations. The new buildings provided six hundred additional beds, most of which were in large rooms holding about thirty patients each. With this increase, the hospital could accommodate nearly eight hundred maternity patients—a figure approaching one-third of the total capacity of the entire hospital.

Since most of the new beds were filled by charity patients and were included within the obstetrical clinic, the clinic was too large

to be supervised by a single professor, and it was divided into two sections of approximately equal size. The sections occupied adjacent rooms and shared some facilities. A second professor of obstetrics was appointed, and each of the two professors was allowed one assistant, who was normally appointed for a two-year term. While the professors conducted rounds, the assistants assumed responsibility for the daily care of patients and for teaching students both in the clinics and in the morgue.

Often, each obstetrical assistant would supervise twenty to thirty births within a twenty-four-hour period, and so it was necessary for them to be available at all times both day and night. For this reason, they were assigned small rooms within the clinic—rooms that served both as offices and as living space. Sixteen nurses were assigned to each section.³ The nurses worked twenty-four-hour shifts; while on duty, they slept in the same rooms as their patients and, if necessary, in the same beds. As for the teaching function of the facility, the course in practical obstetrics lasted two months. In order that student obstetricians could attend all unusual deliveries, they too were provided accommodations within the clinic.⁴

Originally, half the male obstetrical students and half the female student midwives were assigned to each of the two sections of the clinic. However, in 1840 the students were separated as follows: all the males—normally between twenty and forty students—and about eight student midwives were assigned to one section, called the "first section." The remaining student midwives—about thirty in number—were assigned to the "second section."

Patients were assigned to the two sections as follows: all women who required special medical attention were placed in the first section—the section in which obstetricians were trained. Those not needing special attention were distributed between the two sections, depending on the day of the week on which they were admitted. Beginning at four o'clock on Monday afternoons, new arrivals were assigned to the first section. After twenty-four hours,

beginning at four o'clock on Tuesday afternoons, new patients were placed in the second section. Admissions were changed daily in this way except that for forty-eight hours, from Friday afternoons through Sunday afternoons, all new patients were assigned to the first section. Thus, patients were admitted to the first section one day each week more than to the second. For this reason, and because the first section also received all the women with special medical problems, each year the first section admitted between four hundred and five hundred more patients than did the second.

In 1847 one physician gave this account of how deliveries were managed in the obstetricians' section:

Four of the [eight] midwives are reserved for the night duty, and four for the day duty, and each of these must, in her turn, deliver a woman; but one is moreover called upon every eight days to act as the *Journalistin*, i.e., to watch and examine every case in labor admitted during a period of twenty-four hours. Two gentlemen (sometimes only one) are called upon to exercise, conjointly with the midwife in question, a similar function. In the discharge of this duty, they are allowed to repeat these [vaginal] examinations as frequently as they deem it necessary. But this is not all. When the membranes are ruptured, the midwife, according to order, is called to deliver the woman, and one gentleman . . . is also in attendance to witness the delivery. . . . These parties are allowed to make examinations, if they think fit. Again, the professor during his morning visit, and the assistant during the evening visit, not unfrequently make or allow examinations to be made by the gentlemen present, whenever a case of interest presents itself. Practically, therefore, every woman admitted must needs be examined by some five different persons at least, and this number may be doubled or even trebled. The practical instruction is also given in a private course, where the operations are performed upon the dead body of some female.⁵

The medical personnel who worked in the maternity clinics—students, nurses, and professors—all faced a constant risk of contracting syphilis. To appreciate the nature of the problem one must understand something about the disease.

Syphilis can occur in different forms. Ordinarily, within a few weeks of being infected, victims experience a small open sore at the infection site. However, in some cases there is no open wound at all. Even if there is an open sore, it may cause little discomfort and resemble other minor skin infections; so it is easy to overlook. The primary ulceration may gradually heal, and several weeks may pass without symptoms. Next, the victim may develop a rash; at the same time, rough open sores may form within the mouth or on the membranes inside the genitals. However, these symptoms may also be mild and resemble the symptoms of other diseases. Syphilis is most contagious during these early stages. Body fluids or discharges from the open and moist sores on the skin or within the mouth or genitals usually contain vast numbers of syphilis organisms. If these organisms are introduced into surface wounds elsewhere on the body or on other victims, they readily form new lesions.

In time, all the symptoms of syphilis may disappear spontaneously, and the disease may enter a latent phase. Twenty years or more may pass without symptoms; in the latent period, syphilis is not ordinarily contagious. However, even in the absence of overt symptoms, the causal organisms may be attacking various tissues inside the body, including the central nervous system. Finally the disease may show itself again, in a third or tertiary stage. The victim develops new symptoms depending on which tissues have been destroyed by the syphilis organisms; these symptoms may arise slowly over a space of several months. If the central nervous system has been attacked, there may be minor changes in personality as well as headaches and insomnia. The victim may suffer memory loss and become irritable. Often there is a loss of judgment, and the victim becomes indifferent to the affairs of ordinary

life. These changes may occur so gradually that even friends and family members do not realize what is happening. As the disease grows worse, victims may suffer a form of paralysis that begins with the development of a characteristic slapping gait and gradually spreads to other parts of the body. In time, victims may be unable to walk or stand; they may become bedridden and unable even to feed themselves.

Syphilis was common in nineteenth-century Europe. Most of the women who delivered in gratis maternity clinics were unmarried, and many supplemented their meager incomes by working as prostitutes. At any given time, several of the women in the clinics would have been syphilitic. There being no effective diagnostic tests, it was impossible to be sure exactly who had the disease. Syphilis was known to be contagious; but otherwise, little was understood about how it spread or how it could be prevented. There were no standard prophylactic measures such as the use of surgical gloves. Since persons associated with the clinic performed dozens of vaginal examinations each day, they were regularly exposed. Medical personnel with minor cuts or abrasions were especially at risk. Many contracted syphilis while conducting routine examinations; but because the disease often has no distinctive symptoms in its early stages, these clinic personnel may never have known when or how they became infected. Often, the first unmistakable signs did not appear until twenty years after infection.

Primary and secondary syphilis were generally treated by administering nearly lethal doses of mercury, but everyone recognized that even this treatment was ineffective once the disease reached the tertiary stage. There was no effective treatment and the outcome was certain. Obstetricians joked grimly about the disease, and many regarded it as an almost inevitable consequence of their years of work in the maternity clinics.

Various procedures at Vienna's maternity facilities reflected the humanitarian goals of the institution. To ensure the confidentiality

and privacy of patients, admission was conducted within the maternity facility itself rather than through the general administrative offices of the hospital. No visitors—not even regular hospital physicians or staff—were allowed in the paying maternity wards, and access to the entire facility was strictly controlled.

At admission, each charity patient was required to write her name and address on a sheet of paper that was then folded, sealed, and placed on a shelf by her bed. If a patient died, the paper was opened so that her family or neighbors could be notified; if she lived, the unopened paper was returned to her when she was discharged. Otherwise, maternity patients were not required to disclose their names or any other personal information to anyone. Maternity patients were even allowed to wear masks during their entire stay, so that neither the hospital staff nor other patients could later identify them.

In order to reduce the likelihood of abortions—and because it was useful to have available teaching specimens from all stages of pregnancy—women were accepted into the maternity clinic at any time during pregnancy and were allowed to remain there as long as they cared to do so, without charge, even after giving birth. Since the clinic provided better food and lodging than many indigent women could provide for themselves, some women spent three months or longer in the hospital. In return, beyond the usual requirements of being available for use in medical research and teaching, patients were expected to perform housekeeping tasks in the clinic, to sew and knit clothing for the poor, and to nurse orphaned babies.

Associated with the maternity clinic was a foundlings home for the newborn babies of charity patients. Clinic policy—intended to encourage women to deliver in the clinic and, therefore, to be available for use as teaching specimens—specified that infants delivered outside the hospital would be accepted in the foundlings home only in return for the payment of a fee. However, those born suddenly and unexpectedly to women who had actually been

on their way to the hospital were accepted gratis as though they had been delivered in the clinic itself.

Like the charity maternity clinics of the period, the foundlings homes were a consequence of humanitarian ideals, but they fell short of expectations. In the Viennese facility—as in similar institutions throughout Europe—only a few babies survived even one year. Many died from congenital syphilis, but most died in the terrible gastro-intestinal epidemics that periodically swept the institutions, killing virtually all the otherwise healthy inmates. One British physician who visited the Viennese foundlings home observed that each child

was provided with a comforter consisting of a piece of linen stuffed with bread and milk. The food in this was supposed to be changed every twenty-four hours, but human nature being what it is, in many cases it was only renewed after many days. This piece of fermenting filth was stuffed into the child's mouth at every opportunity. Hot one minute, cold the next, and always saturated with saliva, no wonder it was a most efficient means of propagating disease.⁶

In the seventy years between 1784 and 1854, of the 293,544 babies accepted into the Viennese foundlings home, 228,818—almost 80 percent—died before they were adopted or became old enough to be discharged.⁷

In an attempt to reduce this horrible loss, Joseph II ordered that every healthy baby be removed from the foundlings home and consigned to a private family as soon after birth as possible. The family received a state subsidy in exchange for raising the infant. This program had little impact on mortality, but for a time it was popular among Austrian farmers: the law required each farm family to provide one conscript for the Hapsburg armies; accepting a child from the foundlings home promised to provide not only subsidized farm labor but also a relatively painless way of meeting the military conscription. Because of this practice,

contemporaries joked that the Hapsburgs defended themselves with an army of bastards.

Hospitals like Vienna's were intended to provide safe and humane facilities in which indigent women could give birth and, in many respects, were indeed a great improvement over earlier institutions. But women who delivered in the clinics were much more likely to die in childbirth than women who delivered elsewhere, and the clinics soon gained a sinister reputation among the very women they were intended to serve. In the clinics, women were especially vulnerable to a particularly horrible disease known as "childbed fever" or "puerperal fever" (from the word *puerpera*, meaning a woman who had just given birth).

One eighteenth-century English physician described childbed fever as follows:

The disease . . . is ushered in, from the second to the fourth day of confinement, by shivering, accompanied by acute pain radiating from the region of the uterus, increased on pressure, and gradually extending all over the abdomen, with suppression of lochia and milk, much accelerated pulse, furred tongue, great heat of skin, and a peculiar pain in the sinciput [forehead]. [Patients usually have] short breathing, their knees drawn up, and great anxiety of countenance.⁸

Once the symptoms were established, puerperal fever was fatal in more than half of all cases.

Medical literature from the eighteenth and early nineteenth centuries contains hundreds of case histories of victims of childbed fever. Here is a typical account:

Mrs. Y_____, a lady near the Abbey in Westminster, young, and of a strong and healthy habit, after a labour perfectly natural, was suddenly attacked with a violent shivering fit, the third day after delivery, being the 1st of January 1770.

She was also affected with a thrilling, uncommon sensation, as if a cold, wet sheet had been applied round her body.

She complained of headache, and was sick at stomach; during the excess of febrile heat, her pulse beat 130 times in a minute, and was more full and strong than usual in this fever; her countenance was florid, and much altered from its natural state, having an unusual stare with her eyes.

Small portions of emetic tartar [antimony] . . . were given with the saline mixture every four hours. She diluted plentifully with barley-water and balm-tea, but did not perspire.

The second day after the attack a violent bilious purging came on; the antimonial powders were then given by longer intervals, . . .

The fever and diarrhoea continued very violent for three or four days; her belly swelled, and she frequently complained of much pain at the bottom of her stomach, and towards the navel. Sometimes there seemed to be obscure signs of a remission in the morning; but towards the evening the fever again returned with violence. [The physician records that he drew eight ounces of blood and administered various medications.] . . .

A few days before her death she was delirious; her eyes were bloodshot and filled with involuntary tears; at the same time a miliary eruption appeared very thick on her breast and body, and her stools, which were frequent and very fetid, came away insensibly.

Leeches were then applied to her temples; the clysters [enemas] were repeated, and her strength was supported by nourishment and wine; but all without salutary effect, for on the 12th of January she died, and several hours before her death became perfectly sensible.⁹

Healthy young women concluding their first pregnancies seemed especially vulnerable to this horrible disease.

Accounts of isolated cases of what may have been childbed fever appear in Greek and Roman medical texts. However, the earliest recorded epidemic occurred in the Hôtel-Dieu of Paris in 1664. According to the published account, newly delivered women began dying in large numbers. Physicians opened the cadavers of some of the women and found them full of abscesses. A careful search for the cause revealed that the delivery room was located immediately above a room for wounded patients. The physicians concluded that

coarse and infectious vapors, which arose from the wounds and ulcers of the injured bodies, created a mass of impure and malignant air. This air perpetually rose upward and was inhaled day and night by the newly delivered women. The women fell into a bloody flux that ended only with their death.¹⁰

Physicians noticed that the number of fever victims corresponded directly to the number of patients in the lower room and to the relative humidity of the atmosphere.

Through the following two centuries, similar epidemics were described with increasing frequency. By the middle of the eighteenth century, the disease had become common enough to be given the specific names by which it is still known. Over the next hundred years, epidemics of childbed fever continued to devastate the large maternity clinics of Europe.

In the eighteenth century, women in the clinics during epidemic years were at significantly greater risk than those who delivered at home. Otherwise, the risk in the clinics was probably about the same as elsewhere.¹¹ However, by the middle of the nineteenth century, mortality in the clinics had increased substantially. In 1875 one physician estimated that, through the early and middle decades of the century, about 1 in 29 women who delivered in the clinics died, while only about 1 in 212 of those who delivered at home died.¹² Modern historians arrive at similar estimates.¹³

There was considerable variation in morbidity among the hospitals themselves and from one year to another. Over intervals of several weeks, some smaller hospitals reported mortality rates of nearly 100 percent. The Maternité in Paris probably had the highest sustained mortality of any large institution: between 1861 and 1864, almost one-fifth of all deliveries resulted in the death of the mother.¹⁴

While Boer supervised the obstetrical clinic in Vienna, the mortality rate for childbed fever averaged about 1 percent—a very favorable rate. Under Klein, there were two important changes. First, total mortality rose immediately, increasing to about 5 percent. But the incidence of the disease was increasing throughout Europe, and even at 5 percent, the patients in Vienna were safer than those in many other institutions. Thus, in spite of the astounding increase in mortality, childbed fever was not regarded as a problem unique to, or unusually troublesome in, Vienna. However, because so many women delivered in the Viennese hospital, even its relatively low mortality rate involved hundreds of deaths each year. Second, before 1840, the two sections of the maternity clinic had approximately equal mortality rates; beginning in 1840, when the male obstetrical students were all assigned to the first section and most of the female student midwives were assigned to the second section, mortality in the first section was consistently four or five times greater than in the second. Indeed, while the mortality in the second section was seldom above 2 percent, in the first section it was often 10 percent or more.

It soon became obvious that the first section was more dangerous than the second, but no one was exactly sure why. One common explanation was this: since more women were admitted to the first section each year than to the second section, the first section must be more crowded. Physicians believed that the air in crowded hospitals became contaminated by dangerous vapors called “miasms.” Thus, it seemed logical that the miasms would be more intense and therefore more lethal in the crowded first section of the

maternity clinic than in the second. But little was done to address the problem, and the measures taken had little effect.

The official mortality records at the maternity clinic were strictly confidential. But because there were so many deaths, it was common knowledge that maternity patients were in danger there, and that the first section—the section with the male students—was considerably more dangerous than the second. Local women dreaded the prospect of going to the clinic to give birth.

To reduce their chances of contracting childbed fever, while still qualifying for free postpartum care and the services of the foundlings home, some women in labor simply wandered the streets of Vienna until they gave birth—usually in a doorway or in the empty fields just outside the old city walls. Then, carrying their babies in their arms, they walked to the hospital and applied for admission. Since they had delivered while on their way to the hospital, they and their babies were accepted without charge and received the same benefits as were provided to women who had delivered in the clinic. Giving birth even under such horrible circumstances was safer than doing so in the clinic. In discussing this practice, one contemporary obstetrician pointed out that as many as one hundred patients a month were admitted after having delivered on their way to the hospital.¹⁵ Many—perhaps most—of these women had intentionally delayed arrival and had given birth on the street rather than risk delivering in the clinic.

Physicians and public authorities were aware of the ravages of childbed fever: even in official documents the maternity clinics were referred to as “death traps” or “houses of death.”¹⁶ The governments of Europe initiated inquiries, and the disease received extensive attention in medical texts. There were intensive efforts to identify the causes of the disease. But, not surprisingly, physicians reported only the same general causes that they found for all other diseases.

In 1773 a prominent British obstetrician observed that childbed fever could be caused when the "tightness of stays and petticoat bindings, and the weight of the pockets and of the petticoats" press the intestines and block excretion thereby forcing the body to reabsorb its own wastes. Other causes were said to include a sedentary inactive life, improper diet, the attendance of friends in a small room, a large fire, air "rendered foul and unfit for respiration," strong liquors mixed with warm waters, too many coverings, stagnation of lochia in the womb, damp and close houses, want of cleanliness, the ascension of miasms from families living below, or hospital miasms. The physician complained that "the breasts, if drawn at all, are not drawn until several days after delivery, when they are so full as to be perfectly gorged, and as hard as stones, by which means the first milk . . . is thrown back into the circulation," thus leading to milk fever and to childbed fever. He observed that the disease could be caused through "violence by instruments or by the hands in delivery."¹⁷

A contemporary German physician ascribed the disease to rough treatment, retention or suppression of menstruation, chilling, cold drinks, depressing passions, the inhabitation of damp or wet dwellings and suppression of the breast or abdominal-genital secretions. He observed that, once childbed fever began, it could spread by contagion. He warned that it could be conveyed by secretions—especially genital secretions—from ill individuals and that a contagium could be generated when many patients were crowded together without adequate ventilation. He warned against sharing bathtubs, lavatories, and underwear.¹⁸

One British physician observed that, in different cases, childbed fever had been traced

to difficult labour; to inflammation of the uterus; to accumulation of noxious humours, set in motion by labour; to violent mental emotion, stimulants, and obstructed perspiration; to miasmata, admission of cold air to the body, and into the

uterus; to hurried circulation; to suppression of lacteal secretion; diarrhea; liability to putrid contagion from changes in the humours during pregnancy; hasty separation of the placenta; binding the abdomen too tight; sedentary employment; stimulating or spare diet; [or to] fashionable dissipation.¹⁹

Because childbed fever was sometimes attributed to local miasms, when an epidemic became especially intense in a given maternity clinic, the clinic was generally closed, the walls scrubbed and painted, and new linen and bedding procured. But none of these measures was reliable; often the first patients admitted after such efforts would die from the disease. One physician suggested trying to control local miasms by putting basins of chlorinated calcium between the patients' beds.

Therapy for childbed fever usually involved bloodletting. Blood was taken both locally by applying leeches and generally by opening veins or arteries. In 1848 a British physician described his approach:

I immediately order eight or a dozen leeches to be scattered over the abdomen, and to be followed by a linseed or bran poultice; the vagina to be washed out with tepid water, and, if the lochia be fetid, an injection of chloride of soda used; large doses of calomel [mercury] and opium to be given every three hours, and beef-tea administered at intervals; the calomel to be pushed to approaching ptyalism [poisoning]: when this commences, the calomel to be remitted. Should the pain not yield quickly under these means, I either apply more leeches, or, if the strength will not allow of them, make use of the turpentine poultice; the effect of this last is in many cases almost magical.²⁰

A few years later, an American physician recommended this treatment:

Let it be carefully treasured in memory, that there is no specific [remedy] for this disease . . . [but that] the prompt abstraction of blood is called for; take from the arm from twelve to thirty ounces of blood [one to three pints], depending, of course, on the urgency of the case, and in order that there may be nothing equivocal in the impression made on the system, bleed from a large orifice, let there be a bold and full stream; in one word, make your patient faint; syncope [fainting] will more readily be accomplished by placing the patient in the sitting position during the abstraction of blood. . . . The next indication will be a free action on the bowels. . . . We have an important adjuvant in blisters, after the intensity of the disease is somewhat broken; instead, however, of placing them on the abdomen, I greatly prefer applying them on the internal surface of the thighs, immediately over the femoral arteries.²¹

The practice in Vienna was similar. In the 1820s, one physician gave this account:

They employed in most cases, immediately on the commencement of the disease, repeated venesection [opening of the veins], the application of leeches, emollient cataplasms [medicated substances spread over the skin], emollient clysters [enemas]; at a later period, blisters, with the corresponding internal remedies; in some cases calomel and other celebrated remedies; and in some, where gastric affections at first predominated, emetics [to induce vomiting].²²

Twenty years later, in the 1840s, treatment had not changed significantly. One contemporary recorded that therapy at Vienna's General Hospital usually involved massive local and general measures intended to remove heat from the body—especially bloodletting.²³ Another physician recorded that corpses from the Viennese maternity clinic usually arrived in the morgue with enormous open sores on the interiors of the thighs from the

blistering agents that had been applied in attempting to remove poisons from the body.²⁴

Following the program of pathological anatomy, physicians tried to understand childbed fever by studying the morbid changes they found within its victims. Pathologists gave particular attention to changes in the uterus. This seemed reasonable since the disease was associated with birth and since autopsies often disclosed pathological changes in that organ. However, childbed fever left different and apparently unrelated morbid remains that did not always involve the uterus. According to the principles of pathological anatomy, this meant that childbed fever was not a single disease, but a group of symptomatically related diseases; and some physicians stopped talking about childbed fever and fell back on terms like "endometritis" (inflammation of the mucous membrane of the uterus), "metrophlebitis" (inflammation of the veins of the uterus), "meningitis" (inflammation of the tissues surrounding the brain and spinal cord), or "peritonitis" (inflammation of the serous membrane lining the walls of the abdomen). This way of thinking seemed more precise; but when it came to treatment, it led only to the same ineffective results.

The time had come for someone to look at the facts and see something quite different. That person, Ignaz Semmelweis, became Johannes Klein's assistant in the first section of Vienna's maternity clinic in 1846.

Notes

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21. G. S. Bedford, *The Principles and Practice of Obstetrics*, 4th ed. (New York: William Wood, 1868), p. 183.

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