

Semmelweis's Discovery

After rising in the Black Forest, the Danube river flows a thousand miles eastward to the Black Sea. Near the middle of its journey it leaves its eastward course and flows two hundred miles almost due south, bisecting the fertile plains of modern-day Hungary.

About eleven hundred years ago, in the spring of the year 895, Magyar tribes invaded these plains from the east and assimilated or encompassed the small bands of Slavs, Avars, and Franks already living there. Thus began the Hungarian nation. In time, the Magyars accepted Christianity and became part of the loose feudal organization known as the Holy Roman Empire. Being on the eastern edge of the empire, Hungary was particularly vulnerable to incursions by nomadic tribes and by other non-European powers.

By the fifteenth century, the Ottoman Turks—advancing north-west through the Balkans—were attacking Hungary's southern border. In 1526, after a century of intermittent warfare, the Hungarians were decisively defeated at the battle of Mohacs, and the Turks occupied central Hungary. Only the eastern and western edges of the country—known respectively as "Transylvania" and "Royal Hungary"—remained relatively independent from the Turks. Transylvania is now part of Romania, and Royal Hungary

has been annexed to Austria as the province of Burgenland. Modern-day Hungary is approximately that part of the ancient realm conquered by the Turks.

Near the end of the seventeenth century—after about 150 years of Turkish occupation—a combined European army dislodged the Turks and drove them back to the south. The Austrian Hapsburgs, as Holy Roman emperors, had been nominal kings of Hungary and liege lords of the Hungarian nobility since long before the Turkish occupation. As the Turkish threat was dispelled, the Hapsburgs reestablished and intensified their dominion over Hungary. Hungary passed from Turkish to Hapsburg rule.

The Hapsburg empire consisted of dozens of ethnically and linguistically distinct nationalities that occupied central Europe and the Balkans. To increase efficiency and to reinforce their own control, the Hapsburgs appointed mostly Germanic clergy, generals, and administrators. The Hapsburgs also rewarded the loyal nobility by giving or selling them enormous tracts of land in various parts of the empire. Thus, much of Hungary was directly owned or otherwise administered by Germanic nobles, most of whom lived in Vienna. The Hungarians and the other non-Germanic populations in the empire felt oppressed and exploited by their Austrian rulers and administrators. By the beginning of the nineteenth century, the Hapsburgs remained in control, but they faced periodic insurrections and rising nationalism in Hungary as in other parts of their empire.

Budapest, the capital of Hungary, is located on the banks of the south-flowing Danube about seventy miles east of Vienna. Modern Budapest is the union of several previously independent communities that gradually merged. The two largest of these communities were Buda, which grew up around medieval fortifications located on the hilly west bank of the Danube, and Pest, a commercial city on the flat east bank. In the early nineteenth century, the various communities that were merging into Budapest had

a combined population of about seventy-five thousand; thus, the Hungarian city had approximately one-third the population of Vienna. Budapest was inhabited by a mixture of different ethnic groups, the most populous of which were the Magyars, Germans, Slavs, and Serbs.

Just below the south end of the Buda castle—facing the Danube and encircled on three sides by steep hills—is a flat area known as Tabán. At present, Tabán contains an eighteenth-century baroque church, a few apartment buildings, and a modern traffic interchange surrounded by nondescript grassy parks; it is a sleepy and relatively uninteresting section of modern Budapest. However, in the nineteenth century, Tabán was an independent community and an active center of commerce. For a time it was the western end of an important boat bridge that spanned the Danube, and the area was filled with busy shops and markets.

At the beginning of the nineteenth century, József Semmelweis was a prominent grocer in Tabán. Before moving to Tabán in about 1800, Semmelweis had lived in the western part of Hungary—in the narrow strip that remained just outside Turkish control and that is now part of Austria. The Semmelweis family probably descended from a tribe of Franks that inhabited western Hungary even before the Magyars invaded in the tenth century. Semmelweis's grocery store, which was called "To the White Elephant," was located on the ground floor at one end of a long two-story building decorated in the baroque style.

In 1810, at the age of thirty-two, József Semmelweis married Terézia Müller, the daughter of a prosperous coachwright who had migrated to Budapest from Bavaria. József and Terézia Semmelweis lived in an apartment on the second floor of the same building in which József's store was located. Ten children were born to the couple; all were baptized in the Tabán church about one hundred yards from the house in which they lived.

Like many other middle-class commercial families living in Budapest, the Semmelweis family spoke a Germanic dialect, but

the children learned Hungarian in school and spoke it fluently. On school registration forms, the Semmelweis children consistently identified themselves as Hungarian, although they were of Germanic extraction. Ignaz Semmelweis, the fifth child in the family, was born 1 July 1818.

The building in which the Semmelweis family lived and worked still stands on Apród Street in Tabán. The rooms in which they lived are now a museum for the history of medicine. Many of the museum exhibits deal with the life and work of Ignaz Semmelweis. Some books, furniture, and personal effects that belonged to Semmelweis during his lifetime are also displayed.

We have only a few hints about Ignaz Semmelweis's personality. The diary of one contemporary, now lost, is reported to have described him as "of a happy disposition, truthful and open-minded, extremely popular with friends and colleagues."¹ His writings suggest that he was energetic, impulsive, thorough, and sensitive. He described himself as one who disliked and shunned all controversy. A few years after Semmelweis died, one Viennese colleague (in an obituary notice for a different physician) referred to him as "the genial Semmelweis."²

After completing his primary and secondary education mostly in parochial schools in Budapest, in the autumn of 1837 Ignaz Semmelweis entered the University of Vienna. Semmelweis began studying law; but in the following year, for reasons that are no longer known, he changed to medicine. He completed an M.D. in 1844.

Semmelweis applied for the position of assistant in Josef Skoda's clinic for internal medicine, but another physician was chosen instead. Semmelweis then decided to specialize in obstetrics. He twice completed the two-month obstetrics course in the first section of the Viennese General Hospital's maternity clinic. The course was taught by Johannes Klein's son-in-law, Baptist Johann Chiari. Semmelweis was awarded a master's degree in midwifery.

On 1 July 1846, his twenty-eighth birthday, Semmelweis was appointed Klein's assistant in the first section of the Viennese maternity clinic. As assistant, Semmelweis was expected to examine the patients each morning in preparation for Klein's rounds, to assist Klein with obstetrical operations, to supervise difficult deliveries, and to teach the obstetrical students both by conducting demonstrative autopsies in the morgue and by leading afternoon rounds in the clinic. He was also responsible for the clerical records of his section.

In the first section of the maternity clinic, Semmelweis was immediately confronted by the horrible reality of childbed fever. Because it was commonly known that the first section had a much higher mortality rate than the second, women tried to avoid being assigned there. Semmelweis tells us that he was frequently obliged to "witness moving scenes in which patients, kneeling and wringing their hands, beg to be released in order to seek admission to the second section."³ He also writes that "the disrespect displayed by the [hospital] employees toward the personnel of the first section made me so miserable that life seemed worthless."⁴ Despite his best efforts, the incidence of childbed fever in the first section actually increased after he became assistant. As Semmelweis himself tells us, he was bewildered and tormented by the high mortality rate in his section.

In keeping with his training in pathological anatomy, Semmelweis tried to understand puerperal fever by dissecting its victims. He obtained permission from Karl Rokitansky to examine the corpses of all the women who died in the clinic. Semmelweis performed these autopsies early each morning before beginning his regular duties in the first section, and he tells us he was particularly diligent in carrying out this loathsome task. However, he found only a confusing variety of morbid alterations—nothing that explained the difference in mortality rates between the two sections.

The first and second sections of the maternity clinic were adjacent and even shared some facilities. From their proximity,

Semmelweis concluded that any atmospheric influences would necessarily be the same in both clinics and, therefore, such influences could not account for the difference in mortality. The only possibility was that the increased morbidity in the first section was caused by something within the section itself.

In an essay published one year before Semmelweis became Klein's assistant, Eduard Lumpe had endorsed the popular view that most cases of childbed fever in Vienna's clinic were caused by harmful miasms generated within the clinic itself. Because the first section admitted more patients than the second, Lumpe inferred that the first section must be overcrowded, and he further concluded that the harmful miasms were not dispelled from the first section as readily as from the second. According to Lumpe, this was the only possible explanation for the difference in mortality between the sections. Semmelweis quickly saw that Lumpe's explanation was inadequate.

If overcrowding were the cause of death, mortality in the second section would have been larger because the second section was more crowded than the first. Because of the bad reputation of the first section, everyone sought admission to the second. For this reason, the second section was often unable to resume admissions at the specified time as it was impossible to accommodate new arrivals. Or if the second section began to admit, within a few hours it was necessary to resume admitting patients to the first section because the passageway was crowded with such a great number of persons awaiting admission to the second section. In a short time all the free places were taken. In the five years I was associated with the first section, not once did overcrowding make it necessary to reopen admission to the second section.⁵

Semmelweis acknowledged that there were more births in the first section than in the second; but, he observed, for that very reason the first section had been assigned more beds than the second.

In terms of the percentage of occupied beds, the first section was actually the less crowded of the two.

Semmelweis also became persuaded that none of the other recognized causes of childbed fever could account for the difference in mortality. He considered all the usual factors such as inadequate ventilation, too much blood in the circulation, disturbances caused by the pregnant uterus, stagnation of the circulation, decreased weight caused by the emptying of the uterus; protracted labor, wounding of the inner surface of the uterus in delivery, imperfect contractions, faulty involutions of the uterus during maternity, the volume of secreted milk, and the death of the fetus. But because of the way in which patients were assigned to the two sections, the women in the second section were equally vulnerable to all these factors; hence, none of these conditions could explain the difference in mortality.

The high mortality was also attributed to the section's practice of admitting only single women in desperate circumstances. These women had been obliged throughout their pregnancies to support themselves by hard work. They were miserable and in great need, often malnourished, and many had attempted to induce miscarriages. But if these conditions constituted the cause, the mortality rate in the second section should have been the same, since the same type of women were admitted there.⁶

Being unable to explain the difference in mortality by any of the recognized etiological factors, Semmelweis began trying to eliminate every difference between the two sections, however harmless it may have appeared. He determined that the same laundry contractor cleaned the linen for both sections and that the same food was served to all the patients.

The reader can appreciate my perplexity . . . when I, like a drowning person grasping straws, discontinued supine

deliveries, which had been customary in the first section, in favor of deliveries from a lateral position. I did this for no other reason than that the latter were customary in the second section. I did not believe that the supine position was so detrimental that additional deaths could be attributed to its use. But in the second section deliveries were performed from a lateral position and the patients were healthier. Consequently, we also delivered from the lateral position, so that everything would be exactly as in the second section.⁷

Semmelweis even considered the religious practices of the two sections.

The hospital chapel was so located that when the priest was summoned to administer last rites in the second section he could go directly to the room set aside for ill patients. On the other hand, when he was summoned to the first section he had to pass through five other rooms because the room containing ill patients was sixth in line from the chapel. According to accepted Catholic practice, when visiting the sick to administer last rites, the priest generally arrived in ornate vestments and was preceded by a sacristan who rang a bell. This was supposed to occur only once in twenty-four hours. Yet twenty-four hours is a long time for someone suffering from childbed fever. Many who appeared tolerably healthy at the time of the priest's visit, and who therefore did not require last rites, were so ill a few hours later that the priest had to be summoned again. One can imagine the impression that was created on the other patients when the priest came several times a day, each time accompanied by the clearly audible bell. Even to me it was very demoralizing to hear the bell hurry past my door. I groaned within for the victim who had fallen to an unknown cause. The bell was a painful admonition to seek this unknown cause with all my powers. It had been proposed that even this difference in the two sections explained the different mortality rates. . . .

I appealed to the compassion of the servant of God and arranged for him to come by a less direct route, without bells, and without passing through the other rooms. Thus, no one outside the room containing the ill patients knew of the priest's presence.⁸

The two sections were made identical in every possible respect, but no reduction in the high mortality rate of the first section occurred.

The assistants in the various clinics in Vienna's General Hospital were normally appointed for two years. However, in November 1846, after only four months as Klein's assistant, Semmelweis was required to withdraw because his predecessor, Franz Breit, found it necessary to return to his post in the clinic. In the same month that Breit returned, officials at the hospital conjectured that the presence of large numbers of male students in the first section could contribute to the high mortality. Only married women who had themselves given birth were accepted as student midwives. Some authorities speculated that such women were more gentle in conducting examinations than were the unmarried male students; perhaps this had something to do with the morbidity. Consequently, the number of males accepted into the obstetrical course was reduced from forty-two to twenty, and the number of foreign students who were admitted was limited to two. Remarkably enough, the mortality rate in the first section immediately dropped, and there was some optimism that a solution had been found.

During the winter of 1846, while Breit supervised the first section, Semmelweis studied English with the intention of traveling to Ireland to continue his training at the large Dublin maternity hospital. However, in February 1847—after only four months—Breit was named professor of obstetrics at the university in Tübingen and the way was open for Semmelweis to function again as Klein's assistant.

Before resuming his duties, Semmelweis and two of his friends made an excursion to Venice. Semmelweis wrote, "I hoped the Venetian art treasures would revive my mind and spirits, which had been so seriously affected by my experiences in the maternity hospital."⁹ He returned to Vienna on 20 March 1847 and immediately resumed his duties as assistant in the first section.

Upon returning, Semmelweis was shocked to learn that a friend, Professor Jakob Kolletschka, had died while he was away. Kolletschka's death proved to be a turning point in Semmelweis's work. Semmelweis gave the following description of Kolletschka's death and of its impact on his thinking:

Kolletschka, professor of Forensic Medicine, often conducted autopsies for legal purposes in the company of students. During one such exercise, his finger was pricked by a student with the same knife that was being used in the autopsy. . . . Professor Kolletschka contracted lymphangitis and phlebitis in the upper extremity. Then, while I was still in Venice, he died of bilateral pleurisy, pericarditis, peritonitis, and meningitis. A few days before he died, a metastasis also formed in one eye. I was still animated by the art treasures of Venice, but the news of Kolletschka's death agitated me still more. In this excited condition I could see clearly that the disease from which Kolletschka died was identical to that from which so many hundred maternity patients had also died. The maternity patients also had lymphangitis, peritonitis, pericarditis, pleurisy, and meningitis; and metastases also formed in many of them. Day and night I was haunted by the image of Kolletschka's disease and was forced to recognize, ever more decisively, that the disease from which Kolletschka died was identical to that from which so many maternity patients died.

. . . The cause of Professor Kolletschka's death was known; it was the wound by the autopsy knife that had been contaminated by cadaverous particles. Not the wound, but contamination of the wound by the cadaverous particles caused

his death. . . . I was forced to admit that if his disease was identical with the disease that killed so many maternity patients, then it must have originated from the same cause that brought it on in Kolletschka. In Kolletschka, the specific causal factor was the cadaverous particles that had been introduced into his vascular system. I was compelled to ask whether cadaverous particles had been introduced into the vascular systems of those patients whom I had seen die of this identical disease. I was forced to answer affirmatively.

Because of the anatomical orientation of the Viennese medical school, professors, assistants, and students have frequent opportunities to touch cadavers. Ordinary washing with soap is not sufficient to remove all adhering cadaverous particles. This is proven by the cadaverous smell that the hands retain for a longer or shorter time. In the examination of pregnant or delivering maternity patients, the hands, contaminated with cadaverous particles, are brought into contact with the genitals of these individuals, creating the possibility of resorption. With resorption, the cadaverous particles are introduced into the vascular system of the patient. In this way, maternity patients contract the same disease that was found in Kolletschka.¹⁰

Semmelweis realized that practices in the midwives' section were different. In contrast to the obstetrical students, student midwives ordinarily had no contact with cadavers. So here was a difference that could possibly explain the excessive mortality in the first section.

Semmelweis saw that this hypothesis might also explain other facts about childbed fever. For example, ordinarily there was no point in examining women who arrived at the hospital having already given birth, and as a result, women who delivered on the street were seldom examined. Thus, they were not exposed to the cadaverous poison that, as he thought, might be the cause of the disease, and they remained healthy. The relatively greater

incidence of puerperal fever in winter months could be explained by the greater diligence of students in the winter: in summer "the charming surroundings of Vienna are more attractive than the reeking morgue or the sultry wards of the hospital."¹¹ Students who spent their time outside the morgue were less likely to convey cadaverous particles. Semmelweis could also explain why the mortality rate had been low during the years that Boer had directed the clinic and why it had become higher immediately after Klein was appointed: while Boer refused to allow his students to touch corpses, Klein required students to practice using cadavers of both women and fetuses.

It was clear why women delivering for the first time were particularly vulnerable to childbed fever. In a first delivery, the period of dilation was often extended. This meant that such women were examined more often by medical personnel and so were more likely to be exposed to cadaverous matter. Semmelweis could also see why the incidence of childbed fever had declined during the four months that Breit replaced him in the clinic and had then risen sharply after Breit left: Breit performed fewer autopsies than he did. Moreover, while the mortality rate did decline after the number of male students was reduced, this was because of there having been fewer autopsies being performed by the clinic personnel conducting examinations; it had nothing to do with the male students' supposed lack of gentleness. But Semmelweis also saw that his own diligence in performing autopsies had killed many of his patients: "Only God knows the number of patients who went prematurely to their graves because of me. I have examined corpses to an extent equaled by few other obstetricians."¹² Because Semmelweis could explain so many facts with his hypothesis, he was convinced he was on the right track.

Hours or even days after a physician or student would perform an autopsy, his hands bore a fetid smell from the death house. This smell was due to particles of decaying matter retained on the hands and around the nails and could not be removed by

ordinary washing. Semmelweis concluded that some powerful cleaning agent was necessary—one that would destroy these particles. After considering other substances, he decided on a solution of chloride of lime as an effective and inexpensive disinfectant. Near the end of May 1847—about two months after returning from his vacation in Venice—Semmelweis (with Klein's permission) began requiring everyone in his section to wash thoroughly in the chlorine solution before examining patients. Immediately, the mortality rate in the first section dropped slightly below the rate in the second section.

Mortality remained low through June and July. However, in August a new group of students was admitted. Some of the students neglected the washings, and by the end of the month the mortality rate had increased once more. Semmelweis instituted stricter controls: one male student and one midwife were assigned to each woman in labor, and the names of these students were publicly displayed. In this way, Semmelweis could immediately identify anyone who neglected the washings.¹³ Once again the mortality rate fell.

Semmelweis first concluded that cadaverous poisoning was the cause of the increased mortality in the first section. However, in the next few months he became persuaded that other sources of decaying organic matter were also dangerous: "In October 1847 a patient was admitted with a discharging medullary carcinoma of the uterus. She was assigned the bed at which the rounds were always initiated." One of Semmelweis's students later recalled that this woman was in confinement for several days and that, since her case "was highly interesting, everyone wished to examine her."¹⁴

After examining this patient, those conducting the examination washed their hands with soap only. The consequence was that of twelve patients then delivering, eleven

died. The ichor from the discharging medullary carcinoma was not destroyed by soap and water. In the examinations, ichor was transferred to the remaining patients, and so childbed fever multiplied. Thus, childbed fever is caused not only by cadaverous particles adhering to the hands but also by ichor from living organisms. It is necessary to clean the hands with chlorine water, not only when one has been handling cadavers but also after examinations in which the hands could become contaminated with ichor. . . .

A new tragic experience persuaded me that air could also carry decaying organic matter. In November of the same year, an individual was admitted with a discharging carious left knee. In the genital region this person was completely healthy. Thus the examiners' hands presented no danger to the other patients. But the ichorous exhalations of the carious knee completely saturated the air of her ward. In this way the other patients were exposed and nearly all the patients in that room died.¹⁵

These two cases were important to Semmelweis's concept of childbed fever: from them, he inferred that exposure to any kind of decaying organic matter—not just cadaverous particles—could bring on the disease and that decaying organic matter could be conveyed in ways other than on the hands. By the late fall of 1847—about six months after he began the chlorine washings—Semmelweis was convinced that he understood the imbalance in mortality between the two sections and that conscientious washing with a chlorine solution could prevent the extra deaths.

Toward the end of 1847, accounts of Semmelweis's work began to spread around Europe. Semmelweis and his students wrote letters to the directors of several prominent maternity clinics; in these letters they described their recent observations. Ferdinand Hebra, Vienna's celebrated dermatologist and the editor of a leading Austrian medical journal, announced Semmelweis's

discovery in the December 1847 and April 1848 issues of his periodical. Hebra claimed that Semmelweis's work had a practical significance comparable to that of Edward Jenner's introduction of cowpox inoculations to prevent smallpox.

A few obstetricians responded to these announcements, and the responses generally favored the use of chlorine washings. James Young Simpson, the most prominent British obstetrician, wrote back criticizing the Viennese for being so slow to adopt chlorine washings. He claimed that, in recognizing the danger of contagion, Semmelweis had only discovered what the British had recognized years earlier. Christian Bernard Tilanus from Amsterdam reported favorable results from washing in a chlorine solution. Gustav Adolph Michaelis, professor of obstetrics in Kiel, Germany, reported that his clinic had once been ravaged by childbed fever but, since he had adopted chlorine washings, there had been no new cases of the disease. Somewhat later, Semmelweis learned that Michaelis had become convinced he was responsible for the death of his own cousin, whom he had delivered, because she had died of childbed fever. Michaelis became depressed and ended his own life by throwing himself under a train that was speeding into Hamburg.

In his letter, Michaelis also reported to Semmelweis that he had forwarded word of Semmelweis's discoveries to a colleague, Karl Edouard Marius Levy of Copenhagen. In a local medical periodical, Levy published an account of Semmelweis's work together with a critical response. Levy was not persuaded of the need for chlorine washings. He argued that "the amount of infective matter or vapor secluded around the fingernails could not be enough to kill a patient."¹⁶

One year after these first announcements—in the fall of 1848—a young British physician named C. H. F. Routh, who had been Semmelweis's student when the chlorine washings were initiated, wrote a lecture explaining Semmelweis's work. The lecture was presented before an important medical association in London and

was published in a prominent medical journal. A few months later, another of Semmelweis's former students, M. F. Wieger, published a similar essay in a French periodical.

Thus, by the fall of 1848—within only eighteen months of his initial insight—Semmelweis had identified the cause of the excessive mortality in the first section of the obstetrical clinic, he had discovered how to reduce the mortality to the same favorable level that was maintained in the second section, and he had accumulated persuasive statistical evidence that his prophylaxis was safe and effective. Accounts of his discovery were being circulated throughout Europe. He had reason to expect that the chlorine washings would be widely adopted and that tens of thousands of lives would be saved. These were truly impressive accomplishments for a young and inexperienced physician—for someone who was nothing more than what, today, would be called a “head resident.”

Unfortunately, there were already signs of trouble. The first such sign was that physicians who were responding to the early announcements of Semmelweis's work had misinterpreted his claims. Simpson, for instance, saw no difference between Semmelweis's view and the old British idea that childbed fever could be contagious. In fact, Semmelweis was warning against *all* decaying organic matter—not just against a specific contagion that originated from victims of childbed fever itself. This misunderstanding, and others like it, occurred partly because Semmelweis's work was known only through secondhand reports written by his colleagues and students. At this crucial stage, Semmelweis himself published nothing. The misinterpretations that followed these first announcements continued to cloud discussions of his work throughout the century.

The second alarming sign was political: just as Semmelweis's work was being announced by his students and colleagues, Europe was slipping into a period of exceptional political turbulence. Such conditions are not conducive to the disinterested evaluation of evidence and arguments.

In February 1848—two months after Ferdinand Hebra's first editorial announcing Semmelweis's discovery—riots broke out in Paris. The unrest quickly spread to other parts of Europe. On 13 March 1848 students from the University of Vienna demonstrated in favor of increased civil rights, including trial by jury, freedom of expression, and especially freedom of learning at the university. The Viennese demonstration was led by medical students and by young faculty members from the college of medicine. Workers from the suburbs soon joined the demonstration, and the situation grew progressively more ominous. Within hours, the Hapsburgs were forced to make concessions.

In the evening of the same day on which the demonstrations began, the Hapsburgs dismissed Clemens von Metternich, the detested prime minister; they decreed that students would be allowed to form a national guard intended to preserve the peace in Vienna and to protect the civil rights of the populace; and they granted relative independence and self-regulation to the faculties of higher education.

In Hungary, a strong movement for nationalistic reform and independence was already under way. Upon hearing that Metternich had fallen, the Hungarian Diet—led by the eloquent and courageous Lajos Kossuth—demanded the establishment of a national government and of a parliament to be elected by general male franchise. The Hapsburgs quickly granted these demands, but this did not stem the unrest. The Hungarian nationalists became progressively bolder, and many called for complete independence from the Hapsburg empire. However, Hungary contained large populations of Romanians, Croats, Serbs, and Slovaks; and these minorities feared that Hungarian independence would thwart their own nationalistic ambitions and threaten the rights they enjoyed within the empire. They opposed independence from Austria and issued demands of their own. Violence swept the country.

In Vienna, the March riots were followed by months of general unrest. Many of the affairs of ordinary life—including classroom

instruction at the university—were impossible. The Hapsburgs remained in power, but they lived in constant fear of touching off further revolts in Vienna. By October, matters appeared to have stabilized, and the government felt secure enough to move against the Hungarian uprising; an army was ordered into Hungary to restore control. However, many Viennese were sympathetic to the Hungarian cause, and this new act of suppression touched off further violence in the city. Students demonstrated, and a few military units refused to march against the Hungarians. Yet, most of the army remained loyal to the Hapsburgs. The Viennese insurrection was quelled when the army bombarded the city with cannons. In the spring of 1849, Hapsburg armies—assisted by two-hundred thousand Russian troops—overwhelmed the Hungarians and reestablished Hapsburg control. The concessions that had been granted in the spring were withdrawn, and the leaders of the independence movement were imprisoned, exiled, or executed.

Historians disagree about Semmelweis's involvement in the Viennese uprisings and about whether the political events of 1848 influenced his subsequent career. All that is known about the first topic is easy to state: some of Semmelweis's brothers were punished for active participation in the Hungarian independence movement, and one must assume that Semmelweis himself was sympathetic to the cause. There is anecdotal evidence that he joined the National Guard of Vienna, and fifty years later a Swiss physician who had been Semmelweis's student reminisced that Semmelweis often appeared in his National Guard uniform.¹⁷ Beyond this, there is no clear evidence that Semmelweis participated personally in the stormy events of 1848.

Although he seems not to have taken an active part in the Viennese riots, contemporary political developments were destined to have a profound, if indirect, influence on his career. Semmelweis's chief, Johannes Klein, was a conservative Austrian who, no doubt, was unsympathetic to the independence movements

spreading through Hungary and in other parts of the empire. Like many other senior physicians and administrators, Klein saw the increased autonomy of the university as an erosion of traditional values and respect for authority, and he was skeptical of foreign democratic ideals.

Two years earlier, near the end of 1846, Klein had reduced the number of male physicians studying in the obstetrical clinic from forty-two to twenty and had limited the number of non-Austrian students in the clinic to a maximum of two.¹⁸ Klein had justified this change on the grounds that foreigners were less careful in conducting examinations and were therefore more dangerous to the health of patients than were native Austrians. It is difficult not to see this action as a manifestation of Klein's dislike of everything foreign. Given the turbulence in Hungary, it seems likely that Klein mistrusted Semmelweis and that their conflicting political sentiments were a source of mutual animosity. But any hostility on this personal level was swallowed up in more immediate sources of conflict that divided the Viennese medical faculty just at the time Semmelweis's work was being announced.

In January 1849—twenty months after Semmelweis had begun the chlorine washings—Josef Skoda proposed that the medical faculty select a commission to investigate “the causes of the previously high and currently so meaningfully reduced mortality rate” in the first section of the obstetrical clinic.¹⁹ Skoda's proposal was unanimously accepted by the faculty. Even Klein voted in favor of choosing the commission. Klein probably assumed that, as professor of obstetrics, he would himself be selected to serve as a member of the commission. However, when the commission was elected it consisted of Karl Rokitansky, Franz Schuh, and Josef Skoda.

In the next faculty meeting, Klein protested against Skoda's proposal. In explaining his objections, Klein observed that Skoda and the other elected members of the commission had shown themselves to be his personal enemies. Under these conditions,

Klein insisted, work carried out in his clinic could not be evaluated fairly and impartially.

Klein maintained that it was his prerogative as professor of obstetrics to appraise work conducted in his own clinic and that he fully intended to examine the effectiveness of the chlorine washings. A commission of outsiders—such as those who had been elected—would only be meddling in affairs about which they had no special knowledge or training, and such an investigation would certainly disrupt his clinic. Klein insisted that Skoda had shown himself to be his personal enemy and that Skoda's real motive for proposing the commission was that it would serve Skoda's own interests and those of his faction within the faculty.²⁰

A central issue in the ensuing debate was whether the medical faculty actually had the authority to institute, on its own initiative, an investigation of the kind that Skoda had proposed. Skoda, Rokitansky, and other progressive young faculty members assumed that this authority was included among the concessions that the Hapsburgs had granted a few months earlier. But the conservative faction, led by Klein, vigorously disputed this assumption. Klein pointed out that all previous commissions had been initiated by the university administration—not by the faculty—and that nothing in the language of the concessions justified the faculty's action in assuming this new prerogative.

Because of this difference in interpretation, the election of the commission became a test case for measuring the real power and autonomy of the medical faculty. To resolve matters, Klein and his friends appealed to the administrative authorities. Not surprisingly, the authorities ruled that the faculty was not empowered to initiate the investigation; they overturned Skoda's proposal, and Klein was victorious.

In this affair, Klein's opposition did not focus on Semmelweis's ideas about childbed fever or even on Semmelweis's personal political sentiments, but rather on the reform movement within the university—a movement that Skoda and Rokitansky ardently

supported and for which the proposed commission became a symbol. However, once Semmelweis and his work were drawn into this political dispute, it must have been quite obvious to everyone how Klein would react toward his Hungarian assistant. Even Skoda must have seen that, by using Semmelweis to attack Klein, he was exposing Semmelweis to personal and professional disaster.

Semmelweis's two-year appointment in the first section had begun in March 1846. In December 1848—one month before Skoda proposed forming the investigative commission—Semmelweis applied for a two-year extension so that he could continue his research. Such extensions were frequently awarded; indeed, Semmelweis's predecessor in the first section, his contemporary in the second section, and his successor in the first section all extended their original appointments in just this way. At first, Klein responded favorably to the idea of extending Semmelweis's appointment. However, Semmelweis did not continue to enjoy Klein's support.

On 20 January 1849, the very day on which Klein first protested against Skoda's proposal, a young physician named Carl Braun also applied for the position of assistant in the first section—possibly at Klein's own invitation. Semmelweis and Braun were the only two applicants for the post; and since Braun had received almost no special training in obstetrics, Semmelweis was obviously the better qualified. Semmelweis's application was supported by Skoda and Rokitansky and by most of the medical faculty. But—not surprisingly—Klein favored Braun. Since professors were ordinarily allowed to choose their own assistants, Braun received the appointment. On 20 March 1849 Semmelweis's term expired, and he was obliged to abandon his work in the obstetrical clinic.

Notes

1. György Gortvay and Imre Zoltán, *Semmelweis: His Life and Work* (Budapest, Hungary: Akadémiai Kiadó, 1968), p. 38.
2. A notice of the death of Carl Mayrhofer, signed "r," *Wiener medizinische Blätter* 5 (1882): col. 725.
3. Ignaz Semmelweis, *The Etiology, Concept, and Prophylaxis of Childbed Fever*, ed. and trans. K. Codell Carter (Madison: University of Wisconsin, 1983), p. 70. In this passage, and in several below, I have made slight adjustments in the terminology of my earlier translation.
4. Semmelweis, p. 86.
5. Semmelweis, p. 69.
6. Semmelweis, p. 73.
7. Semmelweis, p. 87.
8. Semmelweis, pp. 71–73.
9. Semmelweis, p. 87.
10. Semmelweis, pp. 87–89.
11. Semmelweis, p. 122.
12. Semmelweis, p. 98.
13. Friedrich Wiegner, "Des moyens prophylactiques mis en usage au grand hôpital de Vienne contre l'apparition de la fièvre puerpérale," *Gazette médicale de Strasbourg* 9 (1849): cols. 97–105, at col. 100.
14. Franz Hektor Arneth, "Evidence of Puerperal Fever Depending on the Contagious Inoculation of Morbid Matter," *Monthly Journal of Medical Science* 12 (1851): 505–511, at p. 510.
15. Semmelweis, p. 93.
16. Quoted in Semmelweis, p. 183.
17. Gortvay and Zoltán, p. 63.
18. Semmelweis, p. 84.
19. Erna Lesky, *Ignaz Philipp Semmelweis und die Wiener medizinische Schule* (Vienna: Hermann Böhlhaus, 1964), p. 21.
20. Lesky, pp. 23 f.

4

Resorption Fever

After attempting unsuccessfully to renew his assignment as Klein's assistant, Semmelweis petitioned the Viennese authorities to be appointed docent of obstetrics. A docent was a private lecturer who taught students and who had access to some university facilities, but who was paid by the students themselves rather than by the university. At first, because of Klein's opposition, Semmelweis's petition was denied. He reapplied, but the authorities delayed action on his request for more than a year.

While awaiting the results of his petition, Semmelweis conducted experiments—at Skoda's suggestion—in which the genitals of newly delivered rabbits were brushed with blood and other fluids from human corpses. Most of the rabbits died, and dissection revealed remains similar to those found in victims of childbed fever.

In October 1849, two months after Semmelweis concluded his animal experiments, Josef Skoda delivered a lecture on Semmelweis's work.¹ Skoda's purpose was supposedly to describe Semmelweis's discovery; unfortunately, he also took the opportunity to attack the obstetricians at the University of Prague. According to Skoda, women in the Prague maternity clinic were dying from childbed fever because the medical staff in Prague

were examining their patients without first cleaning their hands. Skoda insisted that these deaths could be avoided if the obstetricians in Prague would only follow Semmelweis's example and require the use of chlorine washings.

Two obstetricians from the University of Prague, Wilhelm Friedrich Scanzoni and Bernhard Seyfert, responded to Skoda. They were outraged by his suggestion that childbed fever in their clinic was due to their own carelessness and denied that cadaverous poisoning was causing puerperal fever at their facility.² They also claimed to have tried chlorine washings, but reported that the procedure had not significantly reduced the incidence of the disease. Somewhat later, a medical student from Prague gave the following account of how chlorine washings were used in Seyfert's maternity clinic:

Seyfert wanted to provide the clinical students with conclusive proof that the washings were entirely useless and that it was impossible to imagine that the infection of maternity patients with cadaverous matter resulted in the [diseased] puerperal state. One must realize that most of the examining students came directly from the morgue and so it was easy for cadaverous matter to be conveyed in this way. In fact, in spite of the so-called washings, the disease did not become less frequent or less intense in the institution. But for me this was no proof against the views of Dr. Semmelweis, because I saw with my own eyes that there was usually nothing resembling a true washing of the hands. Usually, only the fingertips were dipped once into an opaque fluid that had served the same purpose for many days and that was itself completely saturated with harmful matter. Many of the gentlemen finally abandoned even this manipulation and used only ordinary water, often even without soap.³

Almost three years had now elapsed since Semmelweis had initiated the chlorine washings. In those years, Semmelweis—

who said of himself that he sought to avoid all controversy—had become the focus of a fierce power struggle within the Vienna medical faculty, and his work had become the subject of a bitter dispute among European obstetricians. Josef Skoda had provoked both controversies by using Semmelweis's work as a basis for attacking his own enemies. Remarkably, Semmelweis himself had yet to give a lecture or publish a paper on his own work.

On 15 May 1850, seven months after Skoda's lecture, Semmelweis finally presented his findings before the Imperial Viennese Society of Physicians. The discussion of his lecture continued through three successive meetings in June and July. Although the lecture was not published, apparently because Semmelweis did not take the time to write it out, the secretary's minutes of the lecture and of the subsequent discussions were published.⁴ In his lecture, Semmelweis claimed that every case of childbed fever—without a single exception—occurred when decaying organic matter was resorbed (literally, absorbed back) into the living tissues of maternity patients. Because he believed that this was the only way in which the disease ever came about, Semmelweis referred to childbed fever as a "resorption fever."

As we have seen, other accounts of puerperal fever (like standard accounts of most diseases at the time) attributed the disease to many different and unrelated causes. By contrast, Semmelweis insisted that overeating, immorality, fear, chilling, and all the other causes that obstetricians identified were all beside the point; all that mattered was absolute cleanliness. From our vantage point, Semmelweis's claim seems utterly reasonable. However, at the time, it was directly opposed to what everyone else thought about disease causation in general. By adopting this extreme view, Semmelweis made a radical break with existing medical thought—one that separated him from almost every other physician in Europe.

In the July meeting, Eduard Lumpe argued against several of Semmelweis's claims. Lumpe had preceded Franz Breit as Johann Klein's assistant in the first section; and Lumpe's own thorough study of childbed fever had been published five years earlier in 1845, the year before Semmelweis became Klein's assistant. In that paper, Lumpe mentioned virtually all the evidence Semmelweis was now using to support his new concept of the disease, yet Lumpe did not believe this evidence implied that every case of childbed fever had the same one cause. While Lumpe was willing to grant the usefulness of chlorine washings, he emphatically rejected Semmelweis's concept of the disease. Lumpe wrote:

I was originally overjoyed as I heard of the fortunate results of the chlorine washings—as anyone must have been who has had the misfortune of witnessing so many blossoming young individuals fall, as so many unnerved fragile wrecks, before this devastating plague. However, during my two years as assistant in the first section, I observed such enormous variations in the incidence of illness and death that I must doubt the [supposed] origin and prophylaxis currently in vogue.⁵

After many detailed criticisms of Semmelweis, Lumpe concluded:

If adopting the washings makes it possible to avoid even the least significant of the many concurring factors that cause puerperal fever, then their initial adoption was a sufficiently great service. Whether this is in fact the case, only the future can decide. In the meantime, I believe we should wait and wash.⁶

Following Lumpe's lecture, a few physicians commented favorably on the chlorine washings although there is no evidence in the published minutes that anyone in Vienna supported Semmelweis's claim that childbed fever was invariably caused by contamination. Apparently neither Josef Skoda nor Ferdinand Hebra made any comments whatsoever in the discussion of Semmelweis's lecture.

Over the next several months, no new developments and no further public discussions related to Semmelweis's work. Lumpe's critical essay was the only published response to Semmelweis's lecture.

Five months later, in October 1850, Semmelweis was finally appointed docent of obstetrics. However, the terms of the appointment refused him access to cadavers and limited him to teaching students by using leather fabricated models only.

A few days after being notified of his appointment, Semmelweis left Vienna abruptly and returned to Budapest—apparently without so much as saying good-bye to his former friends and colleagues. Semmelweis himself explained that he left Vienna because he was unable to endure further frustrations in dealing with the Viennese medical establishment. During his last year in Vienna, he had been drawn into two major controversies when the developments in the first section of the maternity clinic were used by Skoda to attack Skoda's own enemies. The response to Semmelweis's lecture had been skeptical and unsympathetic; and so far as one can tell from the published record, he received no support from Skoda or from any other supposed friends. After Semmelweis's lecture, there seems to have been no further discussion of his views about childbed fever, and the terms of his appointment as docent denied him access to the facilities necessary for further research. Given all of this, Semmelweis's sudden departure from Vienna seems entirely reasonable, if not totally justified.

In the fall of 1850, Budapest was somber and depressed. Eighteen months earlier, Hapsburg armies had violently suppressed the Hungarian revolution. In the process, they had destroyed parts of the city. When Semmelweis returned from Vienna, life had still not returned to normal.

Several prominent Budapest physicians had actively participated in the Hungarian independence movement. When order

was restored, they were punished by the Hapsburg authorities. János Balassa, the most famous surgeon in Hungary, was temporarily removed from his professorship and imprisoned while other prominent physicians were required to suspend their practices for several months. Hungarian intellectuals hated everything associated with the Hapsburgs. By contrast, Semmelweis seems to have taken no active part in the rebellion. He returned to Budapest having just been appointed docent of obstetrics, an appointment that indicated the Viennese authorities judged him politically safe. Under these circumstances it is not surprising that Semmelweis encountered a cool reception in Budapest. He did not find immediate employment, and he was not quickly accepted as a colleague or friend.

In the spring of 1851, several months after returning to Budapest, Semmelweis was finally given a relatively insignificant position as the unpaid director of a small maternity facility in St. Rochus Hospital. This quaint baroque hospital is still in operation near the center of Pest. It has since been renamed in Semmelweis's honor, and a large statue of Semmelweis has been erected directly in front of its main entrance.

Before Semmelweis's appointment, the maternity clinic at the St. Rochus Hospital, under the direction of a surgeon, had been seriously afflicted with childbed fever. Since no students were trained in the hospital and since few autopsies were performed there, no one saw that Semmelweis's discoveries in Vienna were relevant to the problem. However, upon visiting the hospital, Semmelweis immediately saw what was wrong: the surgeon who directed the maternity facility examined patients while his hands were still caked with blood and tissues from his surgical procedures. Once Semmelweis was appointed director, the surgeon no longer examined the patients. Semmelweis ordered the facility cleaned and immediately adopted chlorine washings. The mortality rate fell just as it had in Vienna's General Hospital.

In spite of his success, Semmelweis's ideas were not accepted by the other obstetricians in Budapest. While Semmelweis was working at St. Rochus Hospital, Ede Flórián Birly was professor of obstetrics at the University of Pest. He never adopted Semmelweis's methods. Birly died three years later in 1854, and it then became necessary for the medical faculty to nominate several candidates from whom the Viennese authorities could select Birly's successor. Semmelweis applied for the position, but he received fewer votes from his Hungarian colleagues than did Carl Braun—Semmelweis's successor as Klein's assistant and his bitter enemy.⁷ In the end, Semmelweis was appointed as Birly's successor, but only because the Viennese authorities overruled the wishes of the Hungarians. The authorities did this on the grounds that only someone who spoke Hungarian could possibly direct the obstetrical clinic in Pest, and Braun did not speak Hungarian. In this way the Hapsburgs forced Semmelweis on his unwilling compatriots.

As professor of obstetrics, Semmelweis instituted chlorine washings at the University of Pest maternity clinic. He insisted that bed linen and all obstetrical equipment and supplies be disinfected before use. Once again he attained impressive results.

Semmelweis had now achieved dramatic successes at three obstetrical facilities. By following strict disinfection procedures, he achieved success in gynecological surgeries that were prohibitively dangerous at other hospitals around Europe. Even so, his ideas continued to be ridiculed and rejected both in Vienna and in Budapest. In 1856, Semmelweis's assistant, József Fleischer reported the success of the new chlorine washings in a prominent Viennese medical periodical. At the conclusion of the report, the Viennese editor added these sentences: "We believe that this chlorine-washing theory has long outlived its usefulness. The experiences and statistical results of most maternity institutions protest against the views presented above. It is time we are no longer to be deceived by this theory."⁸

In 1857 Semmelweis married Mária Weidenhoffer, the beautiful daughter of a successful merchant in Pest. At the time of their marriage, Mária was eighteen and Ignaz was thirty-nine. The couple moved into an apartment in a building on Váci utca, a short walk from the facilities where Semmelweis worked.

In the nineteenth century, Váci utca was an important shopping street. Today it is a noisy and active pedestrian zone, lined with shops that cater especially to tourists. The ground floor of the building in which the Semmelweis family lived is now a bookstore, and a small commemorative plaque to Semmelweis hangs in a front window. The building encloses a quiet courtyard from which an ancient well-worn circular marble stairway ascends to the third floor, where the Semmelweis apartment was located.

Semmelweis and his wife had five children: a son who died shortly after birth; a daughter who died at four months; a second daughter who lived to adulthood, but who remained unmarried; a second son who took his own life at the age of twenty-three, probably as a consequence of gambling debts; and finally, a third daughter—the only one of the Semmelweis children who married and had children of her own.

Semmelweis had delivered his lecture on childbed fever in May 1850 and had left Vienna in the following October. By the time of his marriage in 1857, he had still not published an account of his own research. Nevertheless, his opinions continued to be discussed in European medical literature. While some of those who responded to Semmelweis acknowledged chlorine washings could be useful, by 1859 no one accepted his concept of the disease. Whatever the other physicians may have believed about the need for chlorine disinfection, Semmelweis stood entirely alone in respect to his claim that every case of childbed fever had one common cause.

In 1858 Semmelweis finally published his own account of his work in a short essay, "The Etiology of Childbed Fever." This led

to a flurry of publications. Two years later he published a second essay, "The Difference in Opinion between Myself and the English Physicians regarding Childbed Fever." In October 1860 he published his only book, *The Etiology, Concept, and Prophylaxis of Childbed Fever*. In 1861, when his book did not have the impact that he had hoped, Semmelweis began publishing a series of open letters bitterly attacking various prominent obstetricians. He also explained his views in a letter written in English that appeared in a British periodical.

The account of childbed fever that is set forth in these publications rests on a new definition. Semmelweis defined "childbed fever" as "a resorption fever determined through the resorption of decaying animal-organic matter."⁹ From this definition, it follows that every case of childbed fever has the same one cause, namely, the resorption of decaying animal-organic matter. Semmelweis calculated that, in approximately 1 percent of all deliveries, decaying organic matter was generated within the birth canal of the delivering women: this occurred when tissues were damaged or when fluids or fragments of the placenta were retained in the uterus. While Semmelweis believed that childbed fever was unavoidable in such cases, he was convinced that all other cases of the disease arose when decaying organic matter was introduced into the vascular systems of patients, usually on the hands of medical personnel. This meant that by washing in a disinfectant solution (thereby destroying the decaying organic matter) one could reduce the incidence of the disease to about 1 percent. This was approximately the level of morbidity that Semmelweis achieved in his own practice.

To Semmelweis's contemporaries, his new definition of the disease looked like a semantic trick. By limiting attention to cases that shared the one common cause, Semmelweis appeared simply to be defining most cases of childbed fever out of existence. His concept of childbed fever seemed to trivialize the quest for control of the disease.

Christopher Columbus—while arguing with skeptics, who did not believe that one could reach China by sailing west from Europe—is said to have challenged his opponents to make an egg stand upright on a table. When they were unable to do so, Columbus seized the egg and smashed it onto the table, where it remained standing. The egg of Columbus has become a metaphor for any attempt to solve an intractable problem by disregarding the implicit conditions upon which it depends. This is exactly what Semmelweis appeared to be doing with his new definition of “childbed fever.” Eduard Lumpe observed: “When one thinks how, since the first occurrence of puerperal fever epidemics, observers of all times have sought in vain for its causes and the means of preventing it, Semmelweis’s theory takes on the appearance of the egg of Columbus.”¹⁰

Yet, remarkably, Semmelweis’s approach was exactly the kind of redefinition required to rationalize practical medicine. If diseases could be caused in different and essentially unrelated ways, then no single prophylaxis or therapy could be consistently effective. For example, in the early nineteenth century, “hydrophobia” (rabies) had been defined as an intense inability to swallow. This condition could be caused in several ways—for example, by psychological disorders, by blows to the throat, or by the bites of rabid dogs. Under these circumstances, treatment that might have been effective in some cases would be totally useless in other cases of the same disease. This made therapy so confusing that no systematic measures could ever be discovered. To find such measures, investigators needed to redefine diseases so that each had only one constant cause.

Clearly this was a problem in the treatment of childbed fever. Nineteenth-century physicians believed the very treatment required in some cases of the disease could itself provoke the disorder. Fever was often ascribed to excessive consumption, and the favored treatment was removing blood. But an inadequate diet was also believed to be a possible cause of the disease, and charity patients

were malnourished. Thus, before they could be bled, charity patients were strengthened by being fed nourishing foods. This meant that the first step in treating a charity patient—feeding her—could exacerbate the very inflammation the physician was trying to combat. Physicians warned that treatment must be carefully adapted to the condition of each individual patient. As one practitioner observed, “Only the best physicians of all times have realized that similar cases of the most different diseases require the same treatment and that different cases of the same disease require different treatments. Conditions, rather than the disease, must be the basis for determination.”¹¹ But it was impossible to say exactly which conditions were relevant to making the determination. As a result, treatment was inconsistent and confusing; effective practical medicine was all but impossible. Defining diseases so that each had only one specific cause was an essential step in the development of effective techniques for controlling any disease. Ignaz Semmelweis was among the first to adopt this approach.¹²

Semmelweis’s book was published in 1860 when he was forty-two years old. He expected his book to save the lives of thousands of women who delivered in the maternity clinics of Europe, but the book was ignored and had little impact on contemporary obstetrical practice. Semmelweis was outraged at the callous indifference of the medical profession and began publishing open letters in which he denounced several prominent European obstetricians as irresponsible murderers. Even before this time, Semmelweis had not been held in high regard by his peers. These letters further undermined his professional credibility.

Semmelweis had always expressed himself freely and enthusiastically. Now he turned every conversation to the topic of childbed fever, and he spoke without taking into account those people who may have overheard him. During the summer of 1865, his public behavior became irritating and embarrassing to his associates and

family. He also began to drink immoderately; he spent progressively more time away from his family, sometimes in the company of a prostitute; and his wife noticed changes in his sexual behavior. On 13 July 1865 the Semmelweis family visited friends, and during the visit Semmelweis's behavior seemed particularly inappropriate. As they returned home, it suddenly occurred to Mária that her husband was losing his mind. The next day she confided in Lajos Markusovsky, a Budapest physician who had been Semmelweis's friend since the days when they were medical students together in Vienna.

During the next week, Semmelweis attended a regular meeting of the Pest College of Medical Professors. According to one account, when Semmelweis was called on to make a routine report, "he rose, took a piece of paper from his trousers pocket and, to the stupefaction of those present, began to read the text of the midwives' oath."¹³ This anecdote is invariably cited as conclusive proof that Semmelweis had become insane. However, the author of the account was not himself present at the meeting, and there is no corroboration for the story, which first appeared in print seven years after the alleged event. Moreover, while Semmelweis's name appears twice in the official minutes of the meeting, no comments in the minutes indicate his behavior was in any way unusual. During the meeting, Semmelweis applied for an increase in salary. Within a few days, the increase was approved both by the medical faculty and by the university administrators—developments difficult to understand if his behavior had, in fact, been as inappropriate as the anecdote suggests. The story may be based on some actual occurrence, but it probably gives a false impression of what actually took place.

Semmelweis does seem to have recognized that his health was failing. A few days after the faculty meeting, at his own request, he was examined by a friend and fellow physician, János Bókai. Bókai, a pediatrician and the director of a children's hospital in Budapest, recorded that, until recently, nothing had been

observed "that could be judged as an anomalous expression of [Semmelweis's] mental life. His reasoning was always correct and consistent, his judgment according to his motivations correct; he defended his scientific views with a passion bordering on fanaticism, but with continual consistency in his opinion and in his motivation."¹⁴ For about five weeks, however, the Semmelweis family had been noticing "that his expression and actions were different from his earlier habits." Bókai then mentioned some of the changes in behavior that Mária Semmelweis had earlier observed.

Today, it is impossible to appraise the nature or the seriousness of Semmelweis's disorder. All the recorded symptoms are compatible with several different interpretations. Semmelweis could have been showing early signs of progressive paralysis—tertiary syphilis. Or he could have been emotionally exhausted from overwork and stress. In the nineteenth century, exhaustion was treated by a few weeks' rest in a sanitarium. And indeed, following the examination, Semmelweis made plans to travel to a spa at Gräfenberg in southern Germany for the purpose of undergoing water treatments.

At this point, events took a dramatic and perhaps sinister turn. On 29 July 1865, János Balassa, professor of practical surgery at the University of Pest, wrote a referral committing Semmelweis to a Viennese insane asylum. Contemporary regulations required that such referrals be signed by three physicians. The referral to commit Semmelweis was signed first by a local internist named János Wagner, then by Balassa, and finally by János Bókai, the pediatrician who had examined Semmelweis. Balassa seems to have been hostile to Semmelweis ever since Semmelweis returned to Budapest in 1850; in any event, neither Balassa nor Wagner was among his friends. No evidence exists that either physician examined or interviewed Semmelweis before signing the order. None of the three physicians was trained in psychiatry. Although there were respected psychiatrists in Budapest, not one of them was consulted.

Given the imperfect historical record, it is impossible to decide whether the decision to have Semmelweis committed was justified. This much seems clear: Semmelweis's shrill and progressively more outrageous attacks on the European medical establishment had become embarrassing to everyone around him. Neither his medical colleagues nor his merchant in-laws would have been reluctant to have him silenced. Once Semmelweis began showing signs of instability, these signs may have been quickly—even prematurely—exploited as grounds for having him committed.

On the evening of the same day the commitment order was signed, 29 July 1865, Semmelweis left Budapest—supposedly on the first leg of his trip to the spa at Gräfenberg. He was accompanied by his wife, an unweaned infant daughter, his wife's uncle, and one of his assistants. The first stage of the journey took the party to Vienna by an overnight train. On the following morning, a Sunday, they were met at the Vienna train station by Semmelweis's former colleague and friend Ferdinand Hebra, the prominent dermatologist.

At the station, following a plan that had been arranged in advance, Hebra persuaded Semmelweis to interrupt his trip temporarily and make a short visit to what was purported to be Hebra's own sanitarium in Vienna. While the rest of the party waited with Hebra's wife, Hebra and the uncle took Semmelweis directly to an insane asylum located in Lazarettgasse, not far from the General Hospital. The asylum there was a large public institution—definitely not among Vienna's best.

Upon arrival at the asylum, Semmelweis was neither examined nor interviewed, and no attempt was made to determine whether he actually required confinement. Hebra and the uncle soon managed to slip away. Semmelweis surmised what was happening and tried to escape. A fight ensued in which Semmelweis was severely beaten by several guards. He was secured in a straitjacket and confined within a darkened cell. The next morning his wife

came to the asylum to visit him but was told by the director that a visit would be impossible.

Semmelweis remained in the asylum for about two weeks. A medical record was kept, but this strange document raises more questions than it answers. There is no indication who observed him, who was in charge of his care, or even who compiled the medical record itself. Nowhere in the entire document is there a single reference that would identify anyone professionally associated with Semmelweis while he was in the asylum. There is no indication that Semmelweis was examined or treated by specialists, although there are three incidental allusions to unnamed physicians. Aside from the straitjacket, the only references to treatment involve superficial measures like dousing him with cold water and administering castor oil. Any medical facts given about Semmelweis, such as his pulse rate and temperature, are always given in round numbers and are often only estimated.

Because this medical record was written so carelessly, is so superficial, and contains inconsistencies and modifications, one modern biographer has conjectured that the entire account of Semmelweis's fifteen days in the asylum may have been hastily sketched out from memory *after* Semmelweis died.¹⁵

Early on, the medical record does mention a serious wound in the middle finger of Semmelweis's right hand. Since Bókai did not mention this wound in the account of his examination of Semmelweis, it may have been inflicted on Semmelweis by the asylum guards. Over the days Semmelweis remained in the institution, the anonymous recorder noted that the wound became gangrenous—there is no indication Semmelweis received any treatment for the condition. As the days passed, Semmelweis, unable to sleep, gradually became weaker and delirious. Boils spread over his extremities. Ignaz Semmelweis died in the evening of 13 August 1865 at the age of forty-seven. Although it had been obvious for hours that he was dying and though the

medical record clearly indicated that he was Roman Catholic, no priest was called to administer the last rites.

Semmelweis's body was taken to the pathological institute of the Vienna General Hospital—to the same dissection rooms where he himself had conducted autopsies each morning in his quest for the cause of childbed fever. The autopsy of Semmelweis, supervised and possibly performed by Karl Rokitansky, revealed extensive internal injuries that could have been sustained only in beatings to which he had been subjected in the asylum. The cause of death was identified as pyemia—blood poisoning. Semmelweis had been severely beaten by the asylum guards and then left essentially untreated until his numerous wounds became infected and he died of blood poisoning—one of the diseases that, in maternity patients, would have been called childbed fever.

Semmelweis was buried in Vienna on 15 August 1865. Only a few persons attended the services, and most of those in attendance were from the Vienna General Hospital. These included Karl Rokitansky and two of Semmelweis's bitter enemies, the brothers Carl and Gustav Braun. From Budapest, only Semmelweis's friend Lajos Markusovsky attended the funeral. Not one family member, not one in-law, not one colleague from the University of Pest was in attendance. Semmelweis's wife later explained her own absence on the grounds that, after her husband was committed, she became so ill she had been unable to leave her bed for six weeks.¹⁶

A few Viennese medical periodicals included brief announcements of Semmelweis's death. Two periodicals promised to provide longer eulogies in later issues, but neither promise was kept.

The Budapest periodical *Orvosi Hetilap*, edited at the time by Lajos Markusovsky, contained a brief notice of Semmelweis's death. Remarkably, since Markusovsky had himself attended the funeral, the notice indicates Semmelweis had been taken to Vienna on

20 July and had been buried there on 16 August—both dates were wrong.

Within two weeks of Semmelweis's death, the Hungarian Association of Physicians and Natural Scientists conducted an annual excursion; the group was led by János Balassa. The association rules specified that a commemorative address be delivered in honor of each member who had died in the preceding year. For Semmelweis there was no address; so far as one can judge from the records of the association, his death was never even mentioned. The statutes of the Pest Association of Physicians also required that a eulogy be delivered in honor of each member in the year of his death; in Semmelweis's case, seven years elapsed before this was done.¹⁷

Semmelweis had two assistants, and after his death they both applied for his teaching position. However, at the recommendation of János Balassa, a physician named János Diescher was appointed instead. Earlier in his career, Diescher had completed a course that qualified him to conduct deliveries, but he had never been trained in obstetrics. The extent to which he followed Semmelweis's use of chlorine washings is clear from what happened to the mortality rate at the Pest maternity clinic: as soon as Diescher took charge, mortality jumped to six percent—six times the rate Semmelweis had consistently maintained. But there were no inquiries and no protests; the physicians of Budapest said nothing. Almost no one—either in Vienna or in Budapest—seems to have been willing to acknowledge Semmelweis's life and work. "One said nothing of Semmelweis, it was almost as though one was ashamed of his memory."¹⁸

In 1891 Semmelweis's remains were moved to Budapest. On 11 October 1964 they were transferred once more, this time to a space in the internal courtyard wall of the house in Tabán in which he had been born.

Notes

1. Josef Skoda, "Über die von Dr. Semmelweis, entdeckte wahre Ursache der in der Wiener Gebäranstalt ungewöhnlich häufig vorkommenden Erkrankungen der Wöchnerinnen, und des Mittels zur Verminderung dieser Erkrankungen bis auf die gewöhnliche Zahl," *Zeitschrift der k. k. Gesellschaft der Ärzte zu Wien* 6, no. 1 (1850): 107-117.
2. Wilhelm Friedrich Scanzoni, "Über die von Dr. Semmelweis, entdeckte wahre Ursache der in der Wiener Gebäranstalt ungewöhnlich häufig vorkommenden Erkrankungen der Wöchnerinnen, und des Mittels zur Verminderung dieser Erkrankungen bis auf die gewöhnliche Zahl," and Bernhard Seyfert, "Ergänzende Bemerkungen zu dem vorstehenden Aufsätze," *Vierteljahrsschrift für die praktische Heilkunde*, Literarischer Anzeiger 2 (1850): 25-33 and 34-36.
3. Georg Martius, "Mittheilungen aus den Kliniken zu Prag," *Ärztliches Intelligenzblatt* 4 (1857): 410-415, at pp. 410 f.
4. The minutes are reprinted in Tiberius von Györy, *Semmelweis' gesammelte Werke* (Jena, Germany: Gustav Fischer, 1905), pp. 49-58.
5. Eduard Lumpe, "Zur Theorie der Puerperalfieber," *Zeitschrift der k. k. Gesellschaft der Ärzte zu Wien* 2 (1850): 392-398, at p. 392.
6. Lumpe, p. 398.
7. György Gortvay and Imre Zoltán, *Semmelweis: His Life and Work* (Budapest, Hungary: Akadémiai Kiadó, 1968), p. 93.
8. József Fleischer, "Statistischer Bericht der Gebärklinik an der k. k. Universität zu Pest," *Wiener medizinische Wochenschrift* 6 (1856): cols. 534-536, at col. 536.
9. Ignaz Semmelweis, "Die Aetiologie des Kindbettfiebers," reprinted in von Györy, p. 70; Ignaz Semmelweis, *The Etiology, Concept, and Prophylaxis of Childbed Fever*, ed. and trans. K. Codell Carter (Madison: University of Wisconsin, 1983), p. 114.
10. Lumpe, p. 392.
11. Rudolf Virchow, *Gesammelte Abhandlungen zur wissenschaftlichen Medicin* (Frankfurt a. M., Germany: Meidinger, 1856), p. 34.
12. K. Codell Carter, "Semmelweis and His Predecessors," *Medical History* 25 (1981): 57-72.
13. Gortvay and Zoltán, p. 187.
14. K. Codell Carter, Scott Abbott, and James L. Siebach, "Five Documents Relating to the Final Illness and Death of Ignaz Semmelweis," *Bulletin of the History of Medicine*, forthcoming.
15. Georg Silló-Seidl, *Die Wahrheit über Semmelweis* (Geneva, Switzerland: Ariston, 1978), p. 198.
16. Silló-Seidl, p. 116.
17. István Benedek, *Semmelweis' Krankheit* (Budapest, Hungary: Akadémiai Kiadó, 1983), p. 87.
18. István Benedek, *Ignaz Philipp Semmelweis* (Vienna: Hermann Böhlau, 1983), p. 320.