Chapter Eleven

Surgeon General of the Army

June 1, 1893, the day Surgeon General Charles Sutherland would retire, was prominently marked on many senior army physician calendars. Mrs. Sternberg coyly commented that she and her husband had "heard of the prospective retirement" of Sutherland,[1] and her husband "had learned that other officers of the Corps, junior to him, had forwarded papers and stated reasons for their selection for the office. He therefore submitted his own testimonials and presented his claims…."[2] Sutherland's retirement was not prospective; it was mandatory based on his age. Many medical corps officers prepared their resumes and selected patrons from the political and business worlds who could bring the greatest influence on their nominations. The winner would become a brigadier general with a secure job until he retired for age at 64 years or died. This procedure, although not condoned, was tolerated by the War Department. Although Sternberg had never been a Washington insider, his reputation as a soldier, physician, and internationally renowned scientist had made him a well-known and respected figure in the nation's capital, New York, Philadelphia, and Baltimore. He had a politically and militarily powerful circle of friends and colleagues and was not timid to ask for their help. In early 1893, he had no difficulty rallying his supporters once again. Several of them, such as Dr. Samuel B. Ward of Albany, wrote directly to the president-elect, Grover Cleveland. Ward, a close friend and confidante of Cleveland's, reminded him of Sternberg's yellow fever investigations during the president's first term; Cleveland was surprised and gratified that Sternberg had returned about half of his expense appropriation, and he spent most of the night reading the final report.[3]

If Mrs. Sternberg's recollection is rather disingenuous, the opinion of historian Mary Gillett that "After years of bitter political infighting, during which he had learned how to manipulate legislators and politicians to his own advantage, Sternberg succeeded Sutherland…," is closer to the truth.[4] More accurately, officers contending for the job attempted to secure advantage for a political appointment that became more time critical with each passing surgeon general. It was a cutthroat

game, and Sternberg knew the rules well, the first of which was he who hesitates is lost. He also understood that if he wanted to be surgeon general—and he did—then he would have to outmaneuver a senior, contemporary, and at least one junior officer with powerful connections, Major John Shaw Billings. Sternberg perceived Billings to be his most potent political opponent in this contest and wasted no time in going for the major's jugular. From his Whitehall Street office in New York, he wrote a letter to the Honorable Don M. Dickinson, an influential man on the National Democratic Committee and long-time advisor to Cleveland, which must be quoted at length to fully understand Sternberg's motives:

> "My Dear Sir:
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> "I venture to trespass upon your valuable time…in the belief that you will not be unwilling to give me some advice and assistance with reference to a matter which is of very great importance to me personally.
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> "I have reliable information that a determined effort will be made by the friends of Major John S. Billings, Surgeon, USA to influence Mr. Cleveland to appoint him Surgeon General of the Army…The effort will be especially made by some medical gentlemen in Philadelphia, who have influence with Mr. Harrity, late Chairman of the National Committee. No doubt also through other channels.
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> "A similar effort has been made by Dr. Billing's friends whenever a vacancy has occurred during the past ten or twelve years, notwithstanding the fact that he is 24 files from the head of the list. When Surgeon General Moore was retired, three years ago, a strong effort was made by his friends to induce Mr. Harrison to appoint him….
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> "Dr. Billings has very influential friends owing to the fact that he has been stationed in Washington for the past 25 years, and in his position as Librarian in charge of the library of the Surgeon General's Office he has been able to place many physicians under supposed personal obligations to him by the loan of books and the presentation of Government publications edited by him.
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> "In self defense I feel called upon to make an effort to prevent the success of this scheme to make one of my juniors…Surgeon General. Dr. Billings is 12 files below me in lineal rank and his appointment would prevent me from ever becoming chief of the corps which I have belonged for 32 years.
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> "I enclose herewith a document setting forth the principal facts relating to my services as a medical officer of the Army, and my claims for consideration if the President sees fit to make this appointment from among those who have some years to serve, instead of being controlled by seniority alone…there is a general feeling in the corps that President Cleveland will follow the precedent established by himself and will prefer to select someone who has several years to serve. As a result of this feeling there will no doubt be several candidates among the senior medical officers of the Army. It is not my intention to urge my claims as against any one of these, but I shall respectfully present my own claims as against any of my juniors in service.
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> "Knowing your intimate relations with the President I venture to ask your advice and assistance, and shall take an early opportunity of calling upon you…in New York."[5]

Whether Sternberg made the visit or not is unknown, but his letter was quickly passed on to Daniel S. Lamont, Cleveland's personal secretary and soon-to-be Secretary of War.[6]

In the following weeks, Sternberg also apprised General John M. Schofield of the impertinence of junior officers seeking the surgeon general's office: "I am informed…the friends of at least two medical officers…who are junior to myself will urge their appointment as Surgeon General…I shall respectfully present my

claims…against those of my juniors…The endorsement which you put upon my papers…at that time, was so favorable to this claim & so gratifying to me…that I can not [sic] ask you for anything more. I know…you have consistently favored promotion by seniority & I shall not ask you or any one else to favor my promotion to the prejudice of my seniors. But if the President decides…the interests of the service call for the appointment of some one who has several years to serve, and you are consulted with reference to the matter, I trust…you will feel justified in adhering to the opinion expressed in your endorsement referred to…and will advocate my claims as against any one of my juniors."[7] On May 16, Sternberg felt confident—or perhaps desperate—enough to write the president personally. Included in a detailed transcript of his service record was the following note: "I do not wish to be considered an applicant for the position to the prejudice of my seniors…But if in your judgment the interests of the service call for appointment of a medical officer who has several years to serve before retirement, I most respectfully ask that my claim receive due consideration."[8]

On May 29, the president selected Sternberg. Sternberg was in his Whitehall Street office when the telegram arrived. He rushed off to share the news with Mrs. Sternberg. Finding their home empty, he rushed to Hoagland Laboratory, where he found her hunkered over a microscope. "Put up your microscope, my dear," he directed excitedly, "for I have something to tell you that will cause you to be happy."[9] She smiled at him and held up a telegram that contained the same news. Fully aware of Sternberg's daily involvement at Hoagland, the government had taken no chances that the notification would not be received in a timely fashion. Sternberg remained quiet and introspective on their way home, but once alone inside he looked gravely at his wife and said, "I do not know whether I am happy or not. I face great responsibilities and it is not an easy matter to satisfy everybody, and when I make one man happy by recognizing his ability there will be many others disappointed and disgruntled, so I scarcely know if I am to be congratulated or not. But I know the Medical Corps and am proud of the Corps. I have no family and I shall consider the medical officers my family and will give every man a chance. I shall endeavor to promote a truly scientific spirit in the Corps and where I recognize special ability, I will do all I can to aid the respective officer to achieve success."[10] Sternberg departed immediately for Washington to report to the Secretary of War and begin his new duties.[11]

There was no hyperbole in Sternberg's comment concerning the responsibilities and attendant difficulties he was about to assume. Should he ever forget why he was chosen he only needed to refer to the congratulatory letters from colleagues that began to arrive on May 30. Dr. William H. Welch wrote: "I consider that you deserve the great honor which has come to you and that the medical department of the army is to be congratulated. I am sure that you will be interested in keeping a high standard of efficiency in all respects and especially will not let the scientific side suffer."[12] Dr. Hermann Biggs remarked: "You are to be congratulated…not so much on the promotion, as that was deserved, but on the fact that your ability and scientific work have received the recognition they merit. I was delighted to hear

of the appointment and the only regret associated with it is the fact that it takes you away from New York…"[13] Dr. Stephen Smith penned: "I must congratulate you somewhat, the Medical Department of the Army more, and the great sanitary interests of the country most, on your accession to the Surgeon-Generalship. Your appointment is the best act yet performed by the President and deserves…the hearty commendations of medical men the world over. I am glad to see that you have a decade of service—a period which will enable you to effect great reforms not only in your Department, but in the organization of a National Sanitary Service."[14] Dr. John M. Da Costa of Philadelphia commented, "…I only hope your new post will not interfere with the admirable scientific work for which we are all indebted to you."[15] Doctors William Osler, Victor Vaughn, William Jenkins, A. N. Bell, T. Mitchell Prudden, and Walter Wyman also sent congratulatory notes.[16]

Army Medical Department officers and enlisted men also demonstrated their gratification. Letters and telegrams arrived from officers, notably retired Surgeon General William A. Hammond and General Schofield, and hospital stewards he had served with in the Civil War, at Forts Harker, Riley, Barrancas, and Mason, and Governors Island. Captain Walter Reed wrote from the Department of Dakota in St. Paul: "I cannot refrain from writing just a line to express my gratification over the President's handsome tribute to honest merit. When I think…it places at the head of the Corps the one man who preeminently stands forth as the representative of progressive scientific medicine…means…the fossil age has passed...I know what pleasure it will give to Professor Welch, Dr. Abbott and Dr. Councilman, all of whom have so many times spoken of your untiring energy and ability. I shall always remember Dr. Abbott's remark, made to me on one occasion, when he said, 'All that I am and know concerning bacteriology, I owe to…Dr. Sternberg.' Having no favors to ask…I can all the more sincerely congratulate you."[17] Sternberg had been selected not only because of personal military and scientific achievement, but also because he was—as Reed so eloquently pointed out—the uniformed American personification of the new era of progressive, scientific medicine. The fact that he was elevated over 10 senior officers only highlighted this point, and it was not missed by medical and lay periodicals across the country. The editor of the *Denver Medical Times* wrote "…red-tape and precedence were alike disregarded, and the honor conferred upon the man most eminently fitted for the position by his work and capabilities."[18] *The New York Times* commented the president had "…selected an officer standing many numbers on the Register below that of the grade of the incumbent, and one who will not retire by age about the time he has become familiar with the affairs of the corps and knows its needs."[19]

Sternberg's selection was something of a shock to many more traditionally minded officers and physicians around the country, as had been that of Dr. James Rufus Tryon—jumped over 14 senior officers—to succeed John M. Browne as Surgeon General of the Navy three weeks earlier. The editor of the *Journal of the American Medical Association*, Dr. J. C. Culbertson, while not daring to slander Sternberg or Tryon, lamented that these passed-over officers had been "practically court-martialled and reduced in rank and without the semblance of cause or

justification."[20] But neither selection could have been surprising to astute observers of the new president. Cleveland began his first term in March 1885 with a mandate to improve government efficiency and productivity through administrative reform. In 1893, he began his second term still determined to "do what is right" for the Democrats and the nation.[21] For the medical bureaus of the navy and army, that meant installing leadership that had experience with the line, was medically competent and progressive, and young enough to provide long-term departmental stability. Dr. Ward and long-time friend and personal physician Joseph Bryant probably played a significant role in guiding Cleveland to pick Tryon and Sternberg. Both were relatively young, 56 and 55, respectively, with many years of experience with the line, and they clearly recognized the need and potential for professional growth in their medical departments.

Sternberg had the support of the current administration in Washington and the national medical community at large, but to modernize army medicine and prepare it for war and the century ahead would require the support of those who had been his seniors for the past 32 years. While long-time friend and retired army surgeon, Blencoe E. Fryer, commented, "I would not reflect on the older men in any way, …they have lost interest in professional matters, & if the Medical Department is to keep up with progress, there must be a progressive man in the lead," the support Sternberg was eager to secure came in a letter from one of those passed over.[22] Lieutenant Colonel Joseph C. Bailey, then at army headquarters in San Antonio, Texas, remarked: "No one will congratulate you more cheerily than I do. I have no heart-burnings…and am more pleased with the appointment, for the good of the Corps and the Service as well as for your sake. I was only drawn into the contest at a late date by the stories to my detriment which were being circulated apparently in the interest of Greenleaf. I shall with many others rejoice when the office is rid of him and, with him, the Baxter methods. The Corps is being divided pretty much as Baxter did. I have no fear, however, of your being led around by a string as your poor, weak old predecessor was."[23]

Sternberg took the helm of the Medical Department at a transitional moment for the military and medical professions in the United States. Since the Civil War, practical and theoretical advancements in science and technology had loosened the stifling shackles of Jacksonian philosophy on professional development. No longer considered an elitist, the well-educated professional was becoming the foundation of a modern, progressive society. In the army before 1865, a West Point education was considered wholly adequate for a career officer. But the postwar years included changes in military technology, organization, and tactics, which demanded expertise beyond that obtained at the academy. Army Commanding General William T. Sherman (1869–1883) perceived this need for postgraduate education and training, and for the recognition of army officers as professionals in the same sense as physicians, lawyers, engineers, and the clergy. Sherman also advocated many army reforms that included the establishment of a general staff, an infantry regiment organization conducive to expansion in wartime, and examinations for promotion and lineal promotions. These reforms proved too radical for

the era and were declined by Congress, but Sherman did establish the School of Application for the Infantry and Cavalry at Fort Leavenworth, Kansas, in 1881.[24]

In medicine, Harvard Medical School led this reform movement by instituting a compulsory three-year graded curriculum in 1871. By 1889, 25 percent of American medical schools had followed suit. The establishment of standards for medical education began when 22 schools voluntarily formed the American Medical College Association in 1876. Licensing laws were also reenacted, which required candidates for medical licensure to have diplomas from colleges that met minimum entrance, term length, and length of course requirements. In 1893, the Johns Hopkins University Medical Department was the first school to require a baccalaureate degree. These educational standards were accompanied and stimulated by medical technological advances even more impressive than those of the military. Bacteriology was clarifying the specific nature of infectious diseases, and immunology was promising therapy for the same. Aseptic techniques in conjunction with anesthesia were expanding surgical treatment with better outcomes. Instruments, such as the stethoscope, ophthalmoscope, otoscope, and thermometer were gaining acceptance in routine diagnosis.[25]

This professional growth also directly affected military medicine. By the late 1880s, reports to the surgeon general from medical officers at relatively isolated posts reflected a working knowledge of modern medical science and its relationship to military service. These officers also had the responsibility for the continuing education of a new medical soldier, the hospital corpsman. Established by Congress in March 1887, the Hospital Corps of the Army replaced a small cadre of hospital stewards and a haphazard collection of enlisted medical attendants with a body of physically and mentally qualified and trained hospital stewards, acting hospital stewards, and privates. In 1891, Nicolas Senn, a leading Chicago surgeon, teacher, and researcher, and Surgeon General of the Wisconsin National Guard, recognized the need for a professional corps of National Guard physicians who were also competent military surgeons and proficient military officers. He created the Association of Military Surgeons of the National Guard in September. By 1893, the association was admitting Regular Army and Navy surgeons to its rolls and had changed its name to the Association of Military Surgeons of the United States (AMSUS).[26]

However, the transition that Sternberg and the army encountered in 1893 had a broader scope than professionalism. The conclusion of the Indian Wars, in December 1890, had generated a reduction in posts, 164 to 102 by 1893, and a consolidation of units and their support elements. Congressional appropriations for the army and the Medical Department declined after 1891, and with the nation sliding rapidly into a severe economic depression, were unlikely to increase.[27] Sternberg's budget for fiscal year (FY) 1894, $416,500, and his personnel, 192 officers and 786 corpsmen, could maintain the Medical Department status quo, but they would be hard pressed to create the department the surgeon general envisioned.[28] For Sternberg it was imperative to have sufficient numbers of medical officers and corpsman whose military and medical education were current and

to have every hospital be state-of-the-art. If this could not be obtained in peacetime, then the Medical Department could never successfully deploy to war. Over the next five years, Sternberg used determination, patience, frugality, and political suasion to achieve a thoroughly competent, modernized department prepared for any medical contingency.

His first act as surgeon general, on June 24, was to establish an Army Medical School. It immediately established one of the themes of his administration—military medical preparedness through education and training—and was an idea that had not seen the light of day since Secretary of War Edwin Stanton quashed Surgeon General William A. Hammond's plans for an army postgraduate medical school in 1863. Sternberg recognized the intellectual atmosphere in medicine, and the army was primed and ready to support the creation of an army graduate school of medicine in 1893. Moreover, he had no personal or political enemies to stand in the way of his academic dreams for the Medical Corps. But, like Hammond, he had precious little funding and was obliged to create the school from existing resources. He recreated Hammond's model almost precisely. Classrooms and laboratories were created in available space at the Army Medical Museum. The faculty was selected from medical officers stationed in Washington, and the four-month course of instruction, beginning November 1 of each year, focused on the duties of medical officers, military surgery, medicine, and hygiene. He added courses in sanitary microscopy, pathological histology, bacteriology, and urinology to this curriculum. Sternberg selected Colonel Charles H. Alden as president of the faculty and lecturer on the duties of medical officers; Lieutenant Colonel William H. Forwood, professor of military surgery; Major John Shaw Billings, professor of military hygiene; Major Charles Smart, professor of military medicine and director of the chemical laboratory; Captain Julian M. Cabell, assistant to Forwood and instructor in Hospital Corps drill; and Captain Walter Reed, professor of clinical and sanitary microscopy and director of the pathological laboratory.[29]

To some extent it was a foregone conclusion that if Sternberg wanted a trained military microscopist in this last position immediately, Reed would be the man. The only course of instruction practically available to military officers was William Welch's at Johns Hopkins, and at this date Reed was the only military medical officer to have completed the training. He discussed Reed's qualifications with Billings, Welch, and others—most likely William T. Councilman, Alexander Abbott, Simon Flexner, and William Halsted—in Welch's laboratory. They provided glowing reports of Reed's aptitude, enthusiasm, and energy for bacteriology and scientific medicine, as well as his genial personality, integrity, and sense of humor. In early July Sternberg wired the following to Reed: "The favorable account I have received of your acquirements and scientific zeal…leads me to anticipate for you a successful career in the new field of duty to which you have been called."[30] Intelligent, competent, articulate, and aggressive, Reed was hungry for the work, experience, and mentoring the surgeon general had to offer. He was exactly the type of man Sternberg wanted for a role that—as surgeon general—he could no longer fill himself. In the coming months and years, Reed would become

Sternberg's protégé in laboratory research and his right arm in disease outbreak investigation in the field.

Sternberg was very clear about the purpose of the school in a note sent to the Secretary of War: "There is no need to teach medicine and surgery to graduates of our medical colleges, but there are certain duties of an army medical officer—which the college course has not prepared them—which are more important than the clinical treatment of individual cases of disease and injury.…A special education is needful to prepare a military man to undertake the protection of the public health. The course at the army medical school will prepare him to cope with the questions of practical sanitation that will be presented to him at every turn in his military career."[31] Sternberg considered preventive medicine and public health the foundation for military medical practice, and teaching these principles was the primary function of the school. He also sought to prepare them for their roles as military officers and modern physicians. If medical officers were to be effective in garrison and on the battlefield, then it was imperative that they learn to function and communicate in a military framework. Sternberg expected several of these students to rise to command hospitals in the future where success depended on a thorough understanding of hospital administration, logistics, and military law. Furthermore, the modern medical officer had a responsibility to maintain educational currency, pursue practical research at every opportunity, and share his results with his colleagues.[32]

Stimulating a modern professional commitment to lifelong learning among young medical officers, however, would only begin with classroom and laboratory instruction and mentorship. Its realization would depend on a continuing example from the school and robust support from the Surgeon General's Office. The Medical Museum Laboratory was enlarged and modernized, not only for the benefit of the students, but also to expand its mission to include modern investigative research that would be conducted primarily by Reed and his assistant, Dr. James Carroll. Officers preparing for promotion examinations were posted to stations in or near larger cities where they could take advantage of the advanced clinical and laboratory training available in civilian hospitals, and the most recent texts and literature from the Surgeon General's Library continued to be available to officers engaged in literary research by express mail.[33]

The long hours Sternberg once spent in a laboratory were now spent at his Washington desk or on the road to some distant army post. No task was too mundane or routine for his attention or interest. Although cautioned by friends to let his staff attend to minute details, he felt a keen personal responsibility for every transaction completed and every decision issued from his office. He was also eager to reward intelligent, enthusiastic officers, particularly those in the junior ranks, for exceptional merit. He remained constantly vigilant for outstanding performers, but as Colonel Edward L. Munson recalled, he did not play favorites. Sternberg "leaned backward in his effort not to be influenced by personal preference" and therefore, "had neither friends to reward nor enemies to punish" at the end of the day.[34] The new surgeon general was a man with a vision and a gentleman. He also had

another indispensable quality to a man in his position: the ability to attract bright, able men to him and draw forth their best efforts. Captains Walter Reed, William C. Borden, and Leonard Wood were the first in a long line of medical officers to experience Sternberg's charisma and benefit from his personal interest.

In September 1893, the Pan-American Medical Congress met in Washington with a full agenda. Congress members discussed questions of military medicine and surgery and progress in treating camp diseases and gunshot wounds, debated methods for lifesaving care and evacuation, and compared the effects of new firearms with older, lower velocity weapons. As executive president for the section on military medicine and surgery, Sternberg found it a bully pulpit. These issues, he sagely commented, were of tremendous interest even though "…peace prevails everywhere in the new world…a most friendly feeling exists among North and South America; and…the modern way of settling disputes between nations is by arbitration rather than by resort to arms. But so long as armies exist and deadly weapons are manufactured it will be the duty of the military surgeon to be prepared to render efficient aid to those who fall in battle, and to give the victims of those 'camp diseases' which sap the strength of armies the benefit of the most efficacious treatment."[35] Sternberg emphasized this last duty, sanitary supervision of the command, was overall a larger responsibility than combat trauma management for the regimental medical officer for "…without a doubt, most of the sickness which prevails among soldiers, and especially among new levies of troops, is due to insanitary conditions, and is preventable to a greater or lesser extent according to circumstances."[36] But his main topic was in the realm of combat trauma management, particularly traumatic infections. He predicted in the next conflict, longer range and higher velocity small arms munitions would create a larger ratio of wounded to killed, and first aid rendered by trained hospital corpsmen with immediate evacuation to field hospitals would decrease battlefield mortality. He also cautioned surgeons not to reverse this trend toward increased survivability. In the next war, military surgeons would have to determine to what extent the large mortality from traumatic infections could be prevented by antiseptic methods of treatment. Sternberg reviewed the current knowledge of hospital gangrene, erysipelas, septicemia, and tetanus. These infections, he stated, "…have no longer the terror for us that they had for our predecessors, for the etiology of these traumatic infectious diseases had been elucidated by researches made during the past fifteen years and…the proper measures of prevention are apparent and are systematically applied whenever this is practicable."[37] He considered these measures wholly practicable in a field setting and in the future "there will be no excuse for the occurrence of septicemia after amputations, or for the appearance of erysipelas or hospital gangrene in wounds made by the knife of the surgeon. But how far it may be practicable to prevent such complications in gunshot fractures remains to be seen…."[38]

Although anesthesia and aseptic techniques had allowed surgeons to be more aggressive salvaging limbs and treating penetrating trauma over the past decade, combat variables such as the number and severity of casualties coming from the firing line, availability of secure evacuation to a fixed hospital, and fluidity of the

battle would challenge the surgeon's decision to operate. As surgical textbooks contained no answers and no past experience in the American army existed on which to act, Sternberg concluded his remarks by stating he hoped those gathered would bring their collective wisdom to bear on the issue and arrive at some workable solutions. Science was irrevocably changing medicine as well as the battlefield. Therefore, it was imperative upon the Medical Department to embrace these changes aggressively with its collective talent.[39]

It was a bold challenge, but without a current conflict generating wounded, military surgeons had no clinical material upon which to practice and assess advances in acute trauma care and evacuation. In the civilian medical community, however, experience in trauma management was growing and a few surgeons had demonstrated the advantages of the exploratory laparotomy in cases of visceral perforation when performed by a skilled surgeon, but they also recognized lethal disadvantages when performed by inexperienced or unprepared hands. Both Senn and Sternberg were confident that AMSUS, through annual meetings and published transactions, would be a valuable forum for disseminating new knowledge and techniques.[40]

The 4th annual AMSUS meeting was held in Washington, DC, in early May 1894. Sternberg was elected president, replacing Senn who had served since the organization's inception. The new president was apprehensive that his army duties would preclude him from giving the association the attention it was due. But, if the papers presented are any indication, he took over a very enthusiastic, robust, and self-sustaining 213-member association that was fulfilling the majority of Senn's expectations. Senn's presidential address, "Abdominal Surgery on the Battlefield," at the May meeting was followed by presentations on various methods of evacuation, hospitals, encampments, diet, physical training, antiseptic surgery, weaponry, penetrating wounds of the abdomen and extremities, medical records, and hygienic conditions of enlisted men.[41]

Officers at this and subsequent meetings were tremendously concerned about the organization, equipment, instruction, and fieldwork of the Hospital Corps. Although a vast organizational improvement, the corps was initially regarded with disdain by the line and strong skepticism by medical officers. The improved training system in 1891, a pay increase from $13 to $18 per month the following year, and a competitive oral and written examination for promotion ameliorated these feelings somewhat by attracting a better quality enlistee and reducing the post surgeon's burden of training. But determining the appropriate skill sets for corpsmen without a defined doctrine of how these soldiers were to be employed, especially in wartime, was difficult. With Sternberg's prediction that casualty care had been substantially altered by technological advancements in surgery and weaponry ringing in their ears, medical officers reviewed battlefield care methodologies of foreign armies for a doctrinal template and the standing Hospital Corps curriculum. From their discussions over the next 3 years, the modern combat medic began to evolve.[42]

Although Sternberg was—by and large—satisfied with the progress and direction of the Hospital Corps, his concern over its declining numbers—20 lost in FY 1893

and another 19 by the end of FY 1894—and operational expenses motivated him to shift the geographical focus of the corps. Originally, instructional companies had been located in the west to accommodate the Indian fighting army. Hospital Corps recruits, a large percentage of which came from eastern cities, had to be sent west for training and then brought back to assignments along the Atlantic seaboard. To reduce transportation costs, the surgeon general began transitioning the instructional company at Fort D. A. Russell to Washington Barracks in the fall of 1893. Consolidating training assets at two locations allowed for better standardization of training. It also provided a pool of corpsmen for emergency deployment—such as to Chicago during the Pullman strike riots—and allowed corpsmen and medical officers to train together at the Army Medical School.[43]

The economic crisis, which deepened in 1894, put Congress in a cost-cutting mood, and the military establishment was a prime candidate for fiscal surgeons. Sternberg prepared for the inevitable battle on Capitol Hill that would determine whether his plans for the Medical Department would come to fruition or be eliminated as excess. The House Appropriations Committee's cost-saving actions affected the entire War Department, but the proposed cuts dealt the Army Medical Department a double blow: a 12 percent reduction—a loss of 15 positions—in assistant surgeons and a repeal of the option to hire contract surgeons. Since its reorganization in 1869, the Medical Department had been reduced from 150 assistant surgeons and 184 contract—or acting assistant—surgeons to serve 210 military installations and numerous detachments requiring medical support to 125 assistant and 22 contract surgeons to support 120 posts in 1893. For a generation, Congress had based medical officer appropriations on the number of existing military installations while ignoring the medical demands of detachments away from those posts. Therein lie the frustrations of Sternberg and his predecessors.[44]

The Medical Department had never fielded a full contingent of regular medical officers to all army commands and far-flung outposts. Contract surgeons—even without formal military training—had filled in, more or less admirably, ensuring medical care was available for soldiers and dependents alike; malingerers were weeded out; post sanitation was attended to; the hospital staff was disciplined and drilled; and the physical plant was appropriately managed. Congressional lawmakers considered these important ancillary garrison duties as purely incidental in their drive to save a dollar. They had become convinced that an annual savings in salaries of 20 percent to 25 percent could be achieved if medical services were obtained on a per visit basis. While Sternberg granted that in the past year private physicians had provided medical services at a savings to the smaller arsenals, he was horrified that the committee entertained the idea that private physicians could be employed at most garrisons for less than the salary of an assistant surgeon, which was $133.33 per month. Moreover, he argued, the "principal reason for supporting an army in time of peace is that an efficient organization may be maintained…ready for service in any emergency and serve as a nucleus for the larger army…in case of war. This applies to the Medical Department as well as to the fighting force. The duty of our medical officers is not only to attend to the sick

at their stations; acting at the same time as health officers for the command, but to be prepared, and to prepare their hospital corps detachments, for any emergency, and especially for field service."[45] This view was heartily endorsed in writing by Commanding General Schofield and Generals Oliver O. Howard, Nelson A. Miles, John R. Brooke, Alexander McCook, and Frank Wheaton, virtually all of the Army Department commanders. The debate raged for the entire congressional session, and by July 1894 Sternberg's arguments saved 20 assistant surgeon positions, but made no impact on the loss of contract surgeons. Private physicians would now attend to army personnel and be paid by the government per visit. More devastating to the officers was that pay, allowances, and retirement income were reduced and promotions became even slower.[46]

Sternberg was no stranger to the parsimonious and sometimes quixotic nature of Congress. He had survived it before and was determined it would not interfere with his objectives for the department. Congress had not reduced the Hospital Corps' strength, and officer reductions were allowed to occur through attrition. However, without new accessions, there would not be an 1894–1895 session at the Army Medical School. The first academic session went extremely well. A total of nine students—five newly commissioned assistant surgeons who had been approved by the examining board and four older assistant surgeons—had attended. In addition to the lectures and laboratories given by the regular faculty, ancillary lectures were presented on military law, comparative anatomy, medical jurisprudence, military surgery, and parasitology. Even with his full schedule, Sternberg managed to deliver nine bacteriological lectures. Graduation ceremonies occurred in the afternoon of February 28, 1894, and were highlighted by addresses from Schofield and Dr. William Osler.[47]

Sternberg was tremendously pleased with the success of the school and with the performance of Walter Reed. Promoted to major in early December, Reed had easily taken on the mantle of professor and curator of the medical museum when more critical duties took Billings away from that post. In January 1894, his epidemiological acumen became evident when he investigated a small yellow fever outbreak at Fort Jefferson in Key West, Florida. Upon his return, Sternberg directed him to begin researching the disinfectant value of cresols, which were safer alternative agents to bichloride of mercury and carbolic acid that had come into vogue in Germany. Reed had quickly proved he was a man for all scientific seasons. A close professional and personal relationship soon developed between the two men. Although Reed eagerly absorbed the knowledge and experience of his mentor, the relationship was not unidirectional by any means. Sternberg found in Reed something he had never experienced: a uniformed junior colleague with the inquisitiveness, energy, and mental agility to keep pace with his own medical and scientific plans and aspirations; a scientist he could trust, in the laboratory or field, to be an extension of his own thoughts and actions; and a sounding board for new ideas, but one that reverberated with its own original thoughts. By keeping his chief connected to academia and laboratory bench science, Reed provided a refuge from the stresses incumbent upon the office of surgeon general where

Sternberg could relax among culture plates and reagents, and ponder the science he loved so much.[48]

As he pressed home his vision for improvements in the Medical Department and contended with budget restraints, Sternberg received a call from an old friend in New York City, Dr. Joseph Bryant, a highly skilled surgeon and Cleveland's personal physician. Cleveland, whose health was generally robust for a man so large, had not recovered completely from oral surgery that Bryant performed. The obligation of routinely—let alone emergently—attending to the president from New York was becoming too difficult for Bryant. He asked Sternberg—apparently with Cleveland's approval—to assume this task. Given the opportunity to render service to a man who had supported him in his yellow fever research and his bid to become surgeon general, Sternberg became not only a trusted medical advisor to the president, First Lady, and their family, but also a close friend who had a great deal in common with the chief executive. Both were ministers' sons who enjoyed the outdoors, particularly fishing, and both had a deep fondness for their native upstate New York.[49]

Sternberg's position in medicine, the army, and the inner circles of the government, the overwhelming drive of his multiple interests, compulsive activism, and unrelenting dedication to serve both the local and national communities in which he lived kept him so engaged that one wonders when he found time to exchange pleasantries with Martha. He was an active member of three national medical organizations—the American Medical Association (AMA), American Public Health Association, and AMSUS—and belonged to the Biological, Anthropological, and Philosophical Societies in Washington. All of these organizations sought his leadership and opinions in their governance, at annual meetings, and in their journals. There was barely enough time in the day for him to accomplish all he was obliged to and engage in those projects he wished to pursue. Frugal time management was the key to leading the Medical Department while remaining in the vanguard of American science, and Sternberg demonstrated a phenomenal ability—by nature and nurture from his grandfather Miller—to use every minute to its fullest. Moreover, he was one of those fortunate individuals whose pleasures in life harmonized completely with work, duties, and responsibilities. In the *North American Review,* he advocated once again for the creation of a National Health Bureau; at George Washington University Medical School, he preached against the shoddy grammar and diction of medical school candidates; and in Washington, he assisted materially with the establishment of a new public library. In his free moments, Sternberg concentrated on another first for American medical literature, a textbook of immunology. As with *Malaria and Malarial Diseases* and *A Manual of Bacteriology*, he wrote *Immunity, Protective Inoculations in Infectious Diseases*, *and Serum-Therapy* for both the clinician and medical researcher.[50]

In January 1895, smallpox flared up in Washington. While the Medical Society of the District of Columbia urged public vaccination, Sternberg saw an opportunity to resume research—with Reed's assistance—into smallpox serum therapy he had to shelve two years earlier. At that time, Sternberg was convinced cowpox and horsepox were genetically related to smallpox, so closely related that cowpox was

the bovine manifestation of human smallpox. Since immune calf serum neutralized vaccinia virus, thereby precluding the development of the characteristic vaccine vesicle in calves, it should do the same thing in unvaccinated humans or in those ill with smallpox. Sternberg tested his hypothesis on children in two Brooklyn orphanages by injecting subcutaneously from one to five cubic centimeters of calf serum at the time of vaccination. His results, like those of other researchers in Europe at the time and afterward, were negative. He remained convinced the theory was correct and suggested to Reed that experiments be conducted to test the curative effects of immune calf serum in smallpox cases. Before Reed could initiate this work, Dr. Joseph J. Kinyoun of the U.S. Marine Hospital Service published the results he and Dr. Lewellyn Elliot obtained testing this very hypothesis on two patients in the smallpox hospital in Washington. The first patient had begun to develop hemorrhagic smallpox, a form of the disease that is nearly 100 percent fatal, before the injections could be initiated and died after receiving 60 milliliters of serum. The second patient presented with a standard case of smallpox. He received a total of 105 milliliters of serum with some good effect, and Elliot noted the disease had been shortened.[51]

Although Sternberg left no opinion of Kinyoun's methods published on January 18, it is evident that he was less than impressed with the results, given that the test population was only two and both patients did not present for treatment until heralding eruptions had begun. However, one died and in the other the injections provoked only a modest change in the disease course. Sternberg still had faith in the hypothesis, but apparently some unknown variable, or variables, had yet to be elucidated. Whether this or some other factor gave him pause can only be speculated, but he decided further human experimentation was too risky to pursue. Fortunately, a reasonable alternative candidate for experimentation, one closer to the human species than the cow and susceptible to vaccination with vaccinia, had been found in the Rhesus monkey. Sternberg quickly redirected Reed to pursue the same research using Rhesus and American primates as test subjects. For the next five months, Reed injected immune and nonimmune Rhesus, Cebus, and Cercopithecus monkeys with immune calf and monkey sera. He verified Sternberg's original results that vaccinated calf serum does contain a substance that destroys vaccine virus—as did immune monkey serum—but he also found the amount of this substance in calf serum was exceedingly small and, therefore, the amount of serum required for treatment of human smallpox was too large to be practical.[52]

Progress in the treatment of infectious diseases would remain slow and tedious, yet not so in the realm of surgery. Advancements in surgical science, such as those commented on by Sternberg at the Pan American Congress, were making surgery a practical therapeutic tool not only on the battlefield, but also in routine practice. After Captain William C. Borden demonstrated in 1894 the advantage of hernia repair in returning disabled soldiers to duty, and thereby reducing army disability payments, the surgeon general designated the newly opened Washington Barracks hospital a center for curable disabilities. Moreover, Sternberg told post surgeons to "set aside in their hospitals a special room as an operating room, or when

necessary to submit estimates for the construction of such a room."[53] This was the beginning of a comprehensive hospital renovation and construction project for which the surgeon general secured funds over the next three years. New hospitals with modern operating rooms and clinical laboratories were erected at Fort Myer, Virginia; Fort McHenry, Maryland; Plattsburg Barracks, New York; Fort Meade, South Dakota; and Fort Harris, Montana in 1895; and at Fort Logan H. Roots, Arkansas, the following year. In 1896, x-ray machines began to be installed in larger facilities. By June 1898, 19 hospitals had been upgraded and Forts Hamilton and Wadsworth, New York; Fort Hancock, New Jersey; Fort Monroe, Virginia; and Fort Spokane, Washington, had new hospitals.[54]

Sternberg made his last comments on vaccinia virus immunity to the attendees of the AMA meeting in Atlanta in the spring of 1896. In his whirlwind tour of the most current immunological knowledge, he still endorsed the erroneous belief that cowpox, horsepox, and smallpox were manifestations of the same disease in different animals. He was closer to the mark in some of his other conclusions concerning variola, vaccinia, and the immune response to them. He assured the audience that both of these agents were definitely not bacteria, but were in a class of microbes all their own. Sternberg speculated from previous researches that the substance in the blood of the immune animal acted as a germicide, rather than as an antitoxin, to destroy the virulence of variola. He also noted a number of the inflammatory complications attendant to vaccination resulted from secondary infection by microbial flora common to the skin, which, he contended, could be eliminated by abandoning the scarification method of vaccination in favor of subcutaneous injections of glycerinated vaccine lymph.[55]

Retrospectively, the efforts of Sternberg, Reed, and their civilian colleagues to advance the frontiers of medical science in the waning years of the 19th century are regarded as critical achievements in modern medical progress. Contemporaneously, they were not always so defined. While segments of the public remained skeptical of the new medical science as they continued to suffer through smallpox, typhoid fever, and diphtheria epidemics, others were actively antagonistic to the experimental methods used to obtain new medical knowledge. Antivivisectionists—those opposed to using live animals in experimental research—closely observed the laboratories of Henry P. Bowditch at Harvard and H. Newell Martin at Johns Hopkins, and even harassed Sternberg—through Mrs. Irvin McDowell—at Fort Mason. Their efforts—for the most part—remained local and lacked cohesiveness, and the dearth of U.S. experimentation left them with little grist for the anti-vivisection mill. By the mid-1890s, that had changed, particularly in the nation's capital. Washington had emerged as a scientific and intellectual hub, and animal experimentation flourished on the north side of the Potomac.[56]

These activities provided a focus for scrutiny and a target-rich environment for antivivisectionists all within a stone's throw of Capitol Hill. When the Washington Humane Society exposed animal experiments being conducted in Washington schools by instructors they defined as incompetent, antivivisectionists seized it as the foundation for precedent-setting national legislation. Introduced in the Senate as

"A Bill for the Further Prevention of Cruelty to Animals in the District of Columbia," on January 14, 1896, the restrictive contents of the bill left no doubt the ultimate goal was to stop vivisection in the District of Columbia. Sternberg and other physicians and scientists, such as Dr. Daniel E. Salmon, Chief of the Bureau of Animal Industry; Dr. Charles Wardell Stiles, Head of the Bureau of Animal Industry Zoological Laboratory; Doctors Walter Wyman and Joseph J. Kinyoun of the U.S. Hygienic Laboratory; Acting Secretary of Agriculture, Charles W. Dabney; and Dr. Samuel Busey of the Medical Society of the District of Columbia, defended vivisection in the capital; whereas Daniel C. Gilman, President of Johns Hopkins University; William Henry Welch, now Dean of the Johns Hopkins Medical School; and Dr. William Osler, Johns Hopkins' most renowned clinician, established national opposition. National antivivisection legislation was eventually stopped, but the battle continued for years.[57]

In July, the Sternbergs retreated to Woods Hole, Massachusetts, for some rest and recreation. Although Sternberg could not decline an invitation to present a couple of lectures at the Marine Biological Laboratory, on most days he explored the abundant variety of aquatic flora and fauna, enjoyed clam bakes, and simply spent time with Martha away from the clamor of Washington. An invitation from President and Mrs. Cleveland took them to Gray Gables, the presidential retreat on Buzzards Bay, for a short visit. Cleveland, recuperating from the Democratic national convention earlier in the month, needed a fishing companion and Sternberg was happy to oblige. He found the president's fishing ensemble amusing, especially his soft hat festooned with a variety of colorful lures, but Cleveland looked tired and worn. He had entered the White House for the second time just as the economy tumbled into depression. In 1893, more than 15,000 businesses closed their doors. The next year, a large handful of railroad firms went bankrupt, and as the call for steel rails declined so, too, did the fortunes of their manufacturers. Banks began to fail in turn, and unemployment rose to nearly 18 percent. The president received a pummeling from Republicans and Populists for his steadfast conviction that the Sherman Silver Purchase Act and the McKinley Tariff Bill, both passed in 1890, were major contributors to the economic crisis. Regrettably, Cleveland did not provide the leadership required to unify his party on these issues. By the time the national convention was held, silver advocates held sway within the party, but no serious candidate had appeared to challenge the Republicans. Late in the nominations, William Jennings Bryan delivered a dramatic oration on the virtues of silver and the laboring class that unified silver delegates for a Bryan ticket. This was the origin of the chagrin and fatigue Cleveland felt—and Sternberg discerned so clearly—as their lures broke the placid surface of Buzzards Bay.[58]

The presidential election of 1896 brought victory to William McKinley and the Republican Party. Although not the outdoorsman Cleveland was, he and First Lady, Ida, were enthusiastic horticulturists. They delighted in the conservatories to the west of the White House and various hot houses on the grounds that were stocked with a profusion of domestic flowers, ferns and vines, and exotic tropical flowers and fruits. This alone provided ample common ground for the Sternbergs and McKinleys to establish a friendship, and it appears their welcome at the White

House was continuous from one administration to the next. But Sternberg rapidly became more than an occasional friend with a high regard for botanical beauty. Ida had suffered with petit mal epilepsy and depression since the birth of their second child in 1873. She had been treated—sometimes with apparent success and sometimes not—by physicians in Columbus, New York, and Washington. Although she stubbornly remained at her husband's side as the wife of a congressman, First Lady of Ohio, and now First Lady of the Nation, the social stresses and travel kept her on a continual roller coaster of good days and bad. McKinley needed an experienced physician he could trust and call on without hesitation at any time. The White House had an assigned physician, Captain and Assistant Surgeon Leonard Wood, who owed this posting to Sternberg's power of persuasion over Secretary of War Daniel Lamont's strong objections. Whether it was Sternberg's reputation, the fact that Wood was a very busy doctor-in-waiting for all army officers in Washington, or a word of praise in passing from Cleveland to McKinley, Sternberg continued as primary physician to the First Family. While he did not need this extra responsibility, it was a duty he could not refuse, and there were obvious advantages to having the president's ear and undivided attention during professional visits to see Mrs. McKinley.[59]

Deaths, retirements, resignations, and promotions had finally attrited assistant surgeon numbers below 110. Army Medical Department Examination Boards sat in October 1895 and in September 1896. These had been physically stringent and academically demanding since their inception by Surgeon General Lovell in 1833 and also remained trying ordeals for young candidates during Sternberg's administration. Of 50 candidates in 1895, only 5 were found qualified. A better crop of physicians presented themselves the following year with 8 of 41 recommended for appointment. This allowed the Army Medical School to reopen albeit with some change in staffing; however, the faculty remained dedicated to Sternberg's academic vision, and he won approval to extend the course to five months.[60]

He was less successful in obtaining legislation to have the lineal rank of his young officers determined by their academic performance at the school, but the administrative difficulties for this action were seen as too great by the army. The surgeon general remained delighted with the school's progress. However, he was still burdened with an inadequately manned Medical Department. Training small handfuls of officers was not going to achieve the end state he had in mind. Likewise, he could never field a wholly competent Hospital Corps if it continued to hemorrhage trained soldiers. Over the past three years, the corps had lost an average of 3 percent of its strength annually from expiration of term of service, disability, discharges, desertion, and transfers to the line, and the surgeon general was out of incentives for recruiting. Sternberg remained frugal in his administration of the Hospital Corps. The instructional company at Fort Riley was disbanded for distribution to a handful of posts farther west. For FY 1897, Sternberg recommended that the Hospital Corps appropriation be reduced, and Congress compounded his personnel troubles in March 1896 by capping the number of hospital stewards at 100.[61]

By the time of McKinley's inauguration in March 1897, Sternberg held an extraordinarily unique and influential position in Washington, and his influence

permeated the highest levels of the federal government, the army, the national and international medical communities, and Washington's elite society. In this rarified atmosphere of power and privilege, he could have remained, contemplating the city from a bird's eye view, self-satisfied and complacent, until retirement. But Sternberg's character had never been sullied with self-satisfied complacency. As a genuinely concerned citizen, he not only observed the city and the problems that plagued it close up, but also became actively engaged in the growing agitation for social reform in the District. This movement was led by some of Washington's most prominent citizens, including George M. Kober. Kober, professor of hygiene and state medicine at Georgetown University Medical School, was Sternberg's old friend from the Fort Walla Walla days. Kober retired from the service in 1886 and settled in Washington four years later. By the time Sternberg assumed his duties as surgeon general, Kober had become a well-respected public health educator, reformer, and philanthropist in Washington. These reformers, who would be known as Progressives in the not too distant future, recognized Washington was rotting from within and the decay could no longer be hidden behind massive government buildings and ornate mansions. Washington's tremendous growth in the generation since the Civil War was accompanied by a decline in public sanitation, increasing disease rates, inadequate housing, and poverty. None of these evils existed as a solitary entity, but rather as a mutually supporting malevolent complex, and their eradication would entail a prolonged campaign on a broad front.[62]

Washington had outgrown its water supply, provided by a Potomac-fed reservoir above Georgetown and the sewer lines that discharged waste and storm drainage into Rock and James Creeks and the Washington Canal. In 1889, Kober implicated the Potomac as a potent source of annual typhoid visitations in the District from communities upstream. No substantial action was taken until the persistently high typhoid death rates—7 to 8 per 10,000 population—frightened authorities enough in 1892 to allow a fairly broad sanitary campaign; but the issue finally erupted when Major Charles Smart, chemist at the Army Medical Laboratory, found typhoid bacilli in Potomac water in February 1894. A medical society investigating committee substantiated the Potomac as the source of infection and means of its distribution throughout the city. Moreover, the report noted death rates from typhoid fever in the black community were 34 percent higher than in the white population, but recommendations for a complete overhaul of sewage and water supply and distribution systems were tabled because of the severe economic depression.[63]

The doleful effects of improper sanitation affected the entire city, but the urban poor most acutely felt the impact. A committee on housing the people, chaired by George Kober, conducted an indepth survey of Washington's alley slums. At the time Kober's committee began its work, the alleys were home to 19,000 mainly black Washingtonians. The slums originated in the Reconstruction Era following the Civil War when Washington saw an influx of more than 30,000 ex-slaves. In November 1896, Kober's committee told a lurid tale of human suffering, degradation, and neglect that existed within a few blocks of the Capitol and the elegant mansions on Dupont Circle. High rents, poor maintenance, no sanitation, crime,

vice, and sickness defined the life of alley dwellers. District commissioners at last noticed. That winter, they requested the citizen's relief committee consider ways in which sanitary dwellings could be obtained for wage earners in the city. Sternberg, who presided over the citizen's relief committee, became chairman of the subcommittee on permanent relief and sanitary dwellings for the poor.[64]

Sternberg and his committee conducted their own survey of the alleys and presented their report at a public meeting in February 1897. At this same meeting, attendees were apprised of the most recent attempts at tenement reform and sanitary housing construction in New York City by Dr. Elgin R. L. Gould, president of the City and Suburban Homes Company. With this information and a strong desire to bring rents within the range of the lower wage earner, Sternberg determined that a large, two-story tenement with a central heating plant was the only sensible action. Kober strongly disagreed from an expense standpoint that, when passed on to the renter, would induce overcrowding, sanitation would decline, and disease rates would increase. The laboring family would be no better off than before. Arguing that all the degrading aspects of tenement life would still be present, Kober drove his friend to see Douglas Flats, a two-story tenement raised in the alley between M and N, 25th and 26th Streets, northwest. The tenement had 54 rooms and nearly as many families, and stood as a monument to sanitary and financial failure. Kober advocated building individual homes, but again the expenses incurred would put rentals beyond the reach of those they were trying to assist.[65]

Over the next few days, Sternberg found a compromise to the dilemma and drew up plans for a new type of individual home, the two-flat style. These homes consisted of two independent apartments—one above the other—of three, four, or five rooms with separate entrances, a backyard, small cellar, and an exit to an alley in the rear. This plan, he wrote, "was intended to eliminate all the unpleasant features of tenement houses as they exist in other cities. A good range, with waterback, is placed in the kitchen, and each flat has a well-lighted bathroom, with hot and cold water."[66] He also created the business structure that would—hopefully—attract private investors and renters. Offering dividends of 5 percent and a rebate of one month's rent to tenants who had not required repairs during the year, the Washington Sanitary Improvement Company was organized in April 1897, and Sternberg was elected president. Although the "best known philanthropists and businessmen" in Washington bought stock in the company, they had little confidence in its success.[67] Sternberg's personality, enthusiasm, and diligent promotional work contributed greatly to overcoming the difficulties in securing the $25,000 required to begin operations. Land was purchased on Bates Street between P and Q and First and North Capital Streets, and by mid-November the first eight houses were occupied.[68]

In the spring of 1897, the Secretary of State selected Sternberg to be a delegate to the 12th International Medical Congress that was to be held in Moscow in late August.[69] As a senior member of the section on military medicine, Sternberg was obliged to speak on a pertinent topic. If he had a subject in mind before July 3, it

was abruptly upstaged that day by an electrifying article that appeared in the *British Medical Journal*. Professor Guiseppe Sanarelli announced in a lecture at the University of Montevideo on June 10 that he had found the causative agent, *Bacillus icteroides*, of yellow fever. A well-trained and respected Italian scientist from the Royal University in Bologna, Sanarelli had come to the university to study yellow fever at the request of the Uruguayan government the previous year. His astonishing declaration captured the world's attention. Walter Reed noted later, "No more important achievement in scientific investigation had been claimed since Koch's announcement in 1882 of the discovery of the bacillus of tuberculosis."[70] Given Sanarelli's reputation and publishing of his research in the prestigious *Annals of the Pasteur Institute* gave almost immediate validity by the scientific community. Nothing short of a declaration of war could have engaged Sternberg's attention more. He scrutinized Sanarelli's research, compared it with his own, and prepared a lecture for the conference in Moscow.[71]

The medical congress convened on August 19 in one of the large theaters in downtown Moscow. Sternberg thoroughly enjoyed the scientific sessions and interaction with leading scientists and military medical men from around the world. When he was introduced and moved to the lectern, the audience fell silent in anticipation of what the world's leading authority on yellow fever had to say about Sanarelli's discovery. He began his remarks with a recapitulation of the last yellow fever experiments he had conducted with *Bacillus X*. The bacillus killed guinea pigs and rabbits—the gold standard for determining virulence at the time—but Sternberg had only found it in about 50 of the cases at autopsy and, therefore, he had not reported it in the literature. Addressing Sanarelli's *B icteroides*, Sternberg noted that it had the same structure and characteristics as *Bacillus X*, but the Italian researcher had found it in only 58 percent of liver tissue preparations and never in the alimentary tract. "The evidence thus far presented," stated Sternberg, "is strongly in favor of the view that the bacillus of Sanarelli is identical with my bacillus x. And unless this identity is conceded it will be difficult to admit…the bacillus of Sanarelli is the…yellow fever germ, for I made numerous cultures from…cadavers in Havana…. If the bacillus icteroides of Sanarelli was present in the blood or tissues of yellow fever patients…I could not have failed to find it, as it grows readily in the culture-media employed in my investigations; but unless it is identical with my bacillus x, it was not present in the blood and tissues of the…cadavers examined…during my extended researches in Havana."[72] Proceeding with the hypothesis that the two bacilli were identical, Sternberg then called "attention to the experimental evidence…opposed to the view that yellow fever results from the presence of this bacillus in the blood and tissues of those attacked with the disease."[73] Both he and Sanarelli had shown the bacillus was lethal to guinea pigs and rabbits. Therefore, if the bacillus was in the blood and livers of yellow fever patients, injections of these tissues into laboratory animals should also be fatal, but experiments conducted by Sternberg in Havana had demonstrated this was not the case. Although Sanarelli stated large or small amounts of the bacillus proved fatal when injected into guinea pigs and rabbits, Sternberg found injections of less than 1 milliliter were not

invariably fatal. However, he had to admit it was possible he had missed some positive cases because he had not observed his animals for up to eight to 10 days—as Sanarelli had—before recording a negative result. Moreover, Sanarelli had gone further in his research than Sternberg by injecting dogs, monkeys, sheep, and even humans with cultures of his bacillus, all of which Sanarelli confirmed had demonstrated symptomatological and pathological changes consistent with yellow fever. Sternberg found Sanarelli's research with animals so compelling that he admitted if he had obtained these results he would not have hesitated to announce the discovery to the world either. He concluded his remarks with the sincere hope that Sanarelli's results could be confirmed by subsequent investigations that Sternberg promised to resume immediately with *Bacillus X*.[74]

Reed and members of the Yellow Fever Board would ultimately disprove Sanarelli's claim in Cuba in the summer and fall of 1900. When this fact is combined with Sternberg's well-earned reputation as a destroyer of yellow fever theories, it is tempting to conclude from his Moscow paper that it was his original intention to dispose of Sanarelli's hypothesis as he had those of Freire, Carmona y Valle, and Finley. Nothing could be further from the truth. In Sanarelli's research, Sternberg heard not a death knell for *Bacillus X*, but the glorious sound of trumpets heralding the resuscitation of a long moribund idea. Sternberg realized that if both he and Sanarelli were correct, the jury would remain out until one or the other had demonstrated statistically that the hypothesis was true. The first order of business was to show conclusively the two organisms were one and the same. Once this was completed, definitive experiments on a variety of laboratory animals could be performed relatively quickly. Sanarelli was a bit ahead of him, but it was not too late to achieve the prize. Sternberg had found the bacillus first, and he was determined to prevent Sanarelli from upstaging him as Pasteur had done with the *Streptococcus*. Furthermore, Sanarelli did not have a culture of *Bacillus X*, but Sternberg was reasonably sure of where he could obtain a sample of *B icteroides*. The excitement and anticipation of the investigative work that had to be accomplished made him anxious to return home after the conference. The journey home took Sternberg through Paris where he visited the Institut Pasteur. It was imperative for Sternberg to obtain a culture of *B icteroides* if he were to proceed with these studies. Since Sanarelli had trained there and had his paper on yellow fever published by the institute, Sternberg correctly suspected he could find a pure culture of the bacillus in one of the its incubating chambers. The institute had recently received a fresh culture from Sanarelli, and Dr. Emil Roux gave him a sample.[75]

As Sternberg sailed home in late September, he looked forward to the investigations he and Reed would pursue with *B icteroides*, the maturing of the Army Medical School, and his term as president of the AMA. This last honor was bestowed on him in June at the 50th AMA meeting in Philadelphia. Although he had led the American Public Health Association and the fledgling AMSUS, and actively participated in a wide variety of national and international scientific and medical organizations, none gave him more lasting satisfaction than this most recent recognition by his medical peers. The failed practice on Long Island, a tragic cholera epidemic in Kansas, and the days of exile in California must have seemed distant

to him, if he recalled them at all. He had climbed to professional heights in the army and in medical science that had never been ascended to by an army surgeon before and have never been reached since. In four and a half years, he had—by virtue of his achievements as a soldier, clinician, and scientist, and by the sheer energy of his personality and will—given the Army Medical Department a new direction for the future and remained a preeminent figure in American medical science. Four and a half more years remained for him to consolidate these gains before retirement, and at 59 years, Sternberg's physical energy and stamina still kept pace with an intellect that never slept. For the optimistic Sternberg, the future was always an open book of military and medical challenges waiting to be accomplished by careful analysis, deliberate action, and perseverance.[76]

In seven months, he would need all the optimism, energy, and perseverance he could muster. The Cuban rebellion against Spain, which began in late February 1895, continued to seethe and intensify like a slowly forming tropical storm and threatened—with each passing week in the fall and early winter of 1897–1898—to bring the United States into its vortex. When the storm finally came, Sternberg would be in its very eye. Heavily engaged in providing medical support for an expanded army on two widely separated fronts, he would also fight a rear guard action against vocal and vociferous critics that would threaten not only his prestige as surgeon general, but also his reputation as a scientist.