

## Chapter Four

# A Career in Medical Science Begins

If Sternberg seriously entertained the idea of becoming part of the Army Medical Museum staff in the spring of 1870 so that he could pursue bench-work science in the laboratory, he was sorely disappointed. An alliance between military medicine and science—cooperatively striving to prevent disease and improve the health of the individual soldier—was an idea whose time had not yet arrived. Surgeon General Joseph K. Barnes had already gathered what he considered to be the best and brightest officers of the Army Medical Department—Joseph J. Woodward, John S. Billings, George A. Otis, and Edward Curtis—to staff the museum. They were heavily engaged in compiling the *Medical and Surgical History of the War of the Rebellion*, refining photomicrographic techniques, and testing field medical equipment; so, adding a fifth officer would mean that some field post would go without sufficient medical coverage. Barnes was aware of Sternberg's interests in medical science, but considered them unsupportable. He had approved Curtis and Billings to assist the Department of Agriculture's investigation of diseased cattle, but Congress was funding those research efforts because only healthy cattle turned a profit. The army was not receiving any research grants for any purpose and, furthermore, the results of Curtis and Billings' work only led to disillusionment for the entire idea of a germ theory. Barnes could not waste money or personnel on such unproductive endeavors when the army needed surgeons in field assignments. Therefore, the surgeon general ordered Sternberg to Fort Columbus on Governors Island in New York Harbor. Ironically, this assignment would focus Sternberg on a subject that would put him in the vanguard of the fledgling science of bacteriology for the next 31 years.<sup>1</sup>

On August 14, Sternberg encountered an unusual, yet severe disease in one of the married enlisted soldiers who lived in the tenement house in the northeast corner of the island. The malady swept with lethal rapidity through the barracks that housed the band, the laundress' quarters on the island's eastside, and the officer's

quarters on the north. Based on the signs and symptoms, Post Surgeon Major Charles Page and Sternberg believed they were dealing with a form of malignant malarial fever or perhaps a mild form of yellow fever modified by the northern climate. Page informed Lieutenant Colonel John M. Cuyler, Medical Director, Department of the East, about the crisis, but did not immediately inform the New York City and Brooklyn Boards of Health about the outbreak. On September 2, New York City residents attended the funeral of Private William Harrington, who had died of the enigmatic malady on the island the day before. Ten days later, all four of them were dead. The nature of their deaths was inconclusive, but yellow fever was suspected.

The New York City Board of Health initiated an inquiry into these deaths that led them to Governors Island for answers. The investigating team that consulted with Page and Sternberg on the island included Doctors Stephen Smith, G. Ceccarini, Moreau Morris, J. M. Carnochan, and Thomas Cottman. Of these physicians, only Cottman and Page had any practical experience with yellow fever, and, therefore, the board leaned heavily on their opinions for a reliable diagnosis. Diagnostic criteria for yellow fever consisted of observing characteristic signs and symptoms—such as continuous fever, head and flank pain, nausea, black vomit or other signs of bleeding, and a yellowing of the skin—at the bedside and finding albumin, a protein, in the urine. Apparently, none of the consultants discovered a sufficient amount of these characteristics to diagnose yellow fever. Although Page reiterated that it might be a mild form of yellow fever, it was not the malignant variety he had seen at his southern postings. He leaned toward a malarial fever diagnosis. The board's investigation was rapid but careful, according to board members, and they were happy to proclaim the disease malarial in nature as "... no good could be accomplished by letting the public know that such a dreaded visitation [as yellow fever] had reached their City."<sup>2</sup>

Not all of the board members were convinced that Page's diagnosis was accurate. It was well known that a few ships infected with yellow fever had arrived in the New York Harbor that summer, and not all of them had followed correct quarantine procedures. At the suggestion of Dr. Smith, local physician and nonboard member, Dr. Josiah Clark Nott, who had significant yellow fever experience in Alabama, was requested to reevaluate the matter. On September 28, Nott reviewed and examined cases. He declared it was a yellow fever outbreak. The board of health hastily reversed its original decision, but some of the military surgeons involved still doubted that yellow fever was running rampant on the island. Although Sternberg had agreed with the earlier diagnosis of malaria, Nott's consultation changed his mind. He would never again confuse the two fevers. A request was sent through Post Commander Lieutenant Colonel Thomas H. Neill and Medical Director Cuyler to General Irwin McDowell, commander of the Department of the East, to establish a quarantine of the island and remove the sick to the new quarantine hospital 10 miles down the harbor. This was readily agreed to, and Sternberg was detailed to accompany them. Sixty patients—some of them in a moribund condition—were quickly prepared. Medical orderlies carried patients,

iron beds, and all onto the waiting vessel. The last bed had hardly hit the deck before the steamer's captain—anxious to be rid of his lethal cargo—was ready to shove off. With but a few moments for good-byes, Sternberg embraced his wife. Both were afraid of what the very near future might hold, but neither would betray that emotion for now. "Be a brave little woman," he encouraged hastily, "I will come soon to care for you."<sup>3</sup>

Sternberg's stoicism on the Governors Island dock was merely a charade; in his heart he was terrified for Martha's life. As he waved to her from the steamer's bow, the memory of Louisa's wasted form lying prostrate at Fort Harker filled him with dread for Martha's safety. He had determined that this would not happen to her, even if he had to violate the quarantine. Sometime between the initiation of the quarantine on September 29 and the time he left for the quarantine hospital, Sternberg developed a clandestine plan to get Martha and their maid to safety. In this endeavor he had two accomplices, Neill and a cousin, a successful merchant named Watson, in Newark, New Jersey. Neill agreed to transport Martha and the maid in his personal barge, and Watson would meet the boat on the New York shore with his carriage after dark. Watson would then provide a refuge for the women until the first frost eliminated the disease from the island. Mrs. Sternberg, who was unaware of these events, was surprised when she returned home from tending to a very ill Mrs. Page, the post surgeon's wife, one afternoon late in September, to find Neill anxiously waiting on her porch. "There is a small boat just off our landing waiting for an answer from you," he stated quietly. "Dr. Sternberg has communicated with a cousin of his, asking him to come and take you and your maid with him."<sup>4</sup> It was Neill's turn to be surprised when Martha declined to go. The well-meaning conspirators had failed to anticipate that she would see her duty differently and resist abandoning her husband and home. She also reminded him that they could all be arrested for ignoring the quarantine. Perplexed, the frustrated Neill responded, "We have thought of all of that; my barge will take you and your maid over to New York at 11 o'clock tonight; your cousin will meet you at the Battery with a carriage; you will get immediately into the carriage and proceed out of New York state as quickly as possible."<sup>5</sup> Martha perceived that the details of her flight had been carefully planned and her husband expected her to be on that barge. Neill's promise to watch their quarters removed Martha's last reservations about leaving. Later that night, she and her maid scurried quietly aboard the colonel's barge and escaped to the mainland.<sup>6</sup>

As these events transpired, Sternberg began a long and trying month at the Swinburne Island Hospital. Created on an artificial shoal near Fort Richmond, Staten Island, Swinburne Island Hospital had just been completed. There were ample quarters for physicians and nurses and six well-equipped, pavilion-style hospitals that accommodated 250 patients each. Hospital Steward David Robertson accompanied Sternberg to the quarantine station hospital, but as the epidemic grew, it became apparent that Sternberg's capabilities would soon be overwhelmed if he did not receive greater assistance. To relieve this situation, medical director Cuyler dispatched Lieutenant Colonel Thomas A. McParlin, surgeon at the U.S. Military

Academy, who had had experience with yellow fever during the war with Mexico, and another physician to assist in confirming and treating cases.<sup>7</sup>

By the end of the first week in October, eight of the 60 transferred patients had died, and an average of four new yellow fever cases per day had been received from Governors Island. The epidemic was not abating. The board of health recommended to Cuyler that the island be evacuated until the first frost could halt the disease. General McDowell refused. While he stated his medical director had already reported—although erroneously—the long-awaited frost, he had no safe or decent place to put the 500 men, women, and children that inhabited the post.<sup>8</sup>

At Swinburne Hospital, Sternberg received an education in yellow fever diagnosis and treatment. He wrote to Martha daily. His letters nearly always expressed his relief that she was safe, assurances that their separation would be short-lived, and a confirmation that he too was in the best of health. However, his letters were not pandering attempts to allay his wife's fears by putting a soothing patina over a trying situation. On the contrary, Sternberg shared in detail his daily toil and emotions with her in detail. The extremely long hours at the hospital fatigued him greatly, and the ebb and flow of patients recovering and dying kept his spirits in a constant state of flux. Post Chaplain Davidson, who had been on sick leave when the epidemic struck, returned to minister to the sick and rapidly succumbed as had the little drummer boy in the band; however, Sternberg's clinical efforts seemed to retrieve others from death's door. He hoped to make a short visit to see Martha, but the timing of the barge from Governors Island always frustrated his hopes for this rejuvenating respite.

As cases began to wane, he found a medically related opportunity to go to New York City that included a flying visit to Newark. The long-awaited homecoming was a joyous occasion, but Martha was shocked by her husband's appearance. The fatigue and depression she had only read about now stood before her in the pale, underweight form of her husband. She knew his dedication to patients and after-hours work habits consumed him to the detriment of his own well-being. Epidemic or no epidemic, she was determined to return to the West Bank with him, if only to ensure he was taking care of himself. Sternberg lacked the energy to resist.<sup>9</sup>

The anxiously awaited and much anticipated first frost stubbornly resisted making an appearance until late in October. As expected, the epidemic dried up rapidly, and the Sternbergs returned to their quarters on Governors Island. There had been 157 cases of yellow fever and 49 deaths. The epidemic had left the post shaken and subdued. Effects of the outbreak still lingered. Many buildings on the west side of post had been torn down, and although the quarters looked pretty much the same, every mattress, carpet, and item of bedding had been burned to ensure that the yellow fever poison had been eliminated. During the quiet winter of 1870–1871, officers and enlisted personnel convalesced and many were transferred to new assignments. In late April, Surgeon Madison Mills assumed duties as post surgeon at Fort Columbus, and Sternberg was transferred to Fort Hamilton at the entrance of New York Harbor. Although Mrs. Sternberg remembered the assignment as pleasant, it was extremely short-lived, and her husband spent half of his tour on

temporary duty at Fort Adams, Rhode Island. On June 20, orders transferred them once again, and this time to Fort Warren in Boston Harbor.<sup>10</sup>

The year the Sternbergs spent with the 5th Artillery on the 28-acre George's Island was tranquil, but uncomfortable. With only a weekly boat to Boston, Fort Warren added new meaning to isolation. The granite-arched, casemate-style fort was considered excellent for a strong defensive posture in the harbor, but it was less than accommodating as a residence. Little light penetrated any of the perpetually damp, cold rooms, and the occupants were obliged to keep stoves lit during all seasons. Condensation collected on ceilings, walls, and mirrors; metal objects rusted quickly and mildew spread rapidly on nearly everything else. These conditions and sudden temperature changes were believed to be responsible for the prevailing respiratory diseases and rheumatism on post. Sternberg, like previous surgeons, advised against using the casemates as living quarters, and, also like his predecessors, made little headway. A company-sized garrison made medical duties incredibly light, but their living arrangement was not suitable for a home laboratory. Although this was probably a trial for the semi-reclusive Sternberg, it appears that Martha, with only two other officers' wives with whom to converse on a daily basis, engaged more of her husband's attention and compelled him to socialize more frequently. Sailing and fishing, either from the wharf or rocky shore, were two of their favorite pastimes. Sternberg joined another officer in purchasing a small sailboat, and he enjoyed showing off the skills he had learned long ago on Otsego Lake for Martha. Dinner parties followed by music were the main diversions during the long winter. The garrison's musical ensemble included an officer on piano, Martha on Spanish guitar, and their surgeon on the flute, an instrument he played well, according to his wife.<sup>11</sup>

In July 1872, Sternberg was reassigned as acting medical director, Department of the Gulf, while Medical Director James Simons was on extended leave. The first issues he encountered were well known to him from the war: yellow fever, sanitation, and quarantine. By 1872, the effects of the declining value in state-issued paper currency and the oppression of radical reconstruction were taking their toll on the city's institutions, such as the Louisiana State Board of Health. The board had resumed its age-old struggle with epidemic disease after being returned to state control by the federal government in 1866. Although some health authorities worked diligently to maintain hygienic standards, quarantine and sanitary measures were not executed with the same rigor as they had been under martial law. Cholera and yellow fever had visited the city that year. Cholera claimed 1,200 lives, and yellow fever claimed another 185. In the following year, yellow jack returned with a vengeance and accounted for 3,000 deaths. Although an absolute quarantine with other cities was a sure fix to the problem, it was also a double-edged sword that had to be wielded carefully. Tight quarantine regulations might preclude yellow fever, but they also caused a decline in commerce that risked the city's economy. Public health officials had to be sensitive to both issues. Although local physicians and public health advocates, such as Dr. Stanford Chaille, recognized the need for sanitary reform in the "unsewered [sic] streets and the heaps of

decomposing garbage which rot unmolested in the sluggish gutters,” they found it difficult to convince legislators to fund long-term programs.<sup>12</sup> It was, therefore, no surprise when yellow fever reappeared during the summer of 1872. Fortunately, yellow jack remained localized to the wharf district and a few other contiguous areas. More importantly for Sternberg, the outbreak provided the opportunity to meet local city physicians, such as Chaille, Joseph Holt, Edward H. Barton, Jean-Charles Faget, and Joseph Jones, and become actively involved with yellow fever again. The yellow fever epidemic at Fort Columbus had made a significant impact on Sternberg. It stimulated an interest that intensified over time and demanded description, analysis, explanation, and, hopefully, publication. Now he was in the proper venue to resume his literary work with colleagues who were interested and experienced with the disease.

With Dr. Simons’ return in mid-October, Sternberg was reassigned to Fort Barrancas, nine miles from Pensacola on the Florida panhandle. The cultural, intellectual, and professional stimulation and excitement to which they had become accustomed over the past 18 months in New York, Boston, and New Orleans ended abruptly when the steamer docked them at the Barrancas wharf. Fort Barrancas, a small artillery post, sat on a sandy plateau overlooking Pensacola Bay. Warrington, the Navy Yard, was situated a mile to the east on the road to Pensacola, and the village of Woolsey was located just north of the yard. An increase in the size of the garrison the previous year had induced the government to renovate some of the older officer’s quarters and construct three new units, as well as new quarters for the laundresses. However, in Mrs. Sternberg’s words, “Fort Barrancas was not an attractive post. The officer’s quarters were new frame buildings, neither well planned nor well built. We chose a set of quarters near the hospital; the house was surrounded by a wide porch which added to our comfort during the summer season.”<sup>13</sup> Each set of quarters was elevated and surrounded by a picket fence and a boardwalk, built to keep the children out of the burr grass that grew in abundance, and connected all of the post houses. Except for this unattractive and irritating weed and a few fruit and magnolia trees, the sandy soil failed to grow anything of beauty.<sup>14</sup>

Although less than impressed with the new post and surroundings, the Sternbergs appreciated that condensation was not continually dripping from every wall, their world was not circumscribed by water, and field deployment was unlikely. Although Fort Barrancas was not a garden spot, they determined there was no reason why the confines of their picket fence could not become one. Gardening was a relaxing pleasure the Sternbergs had always enjoyed, but the soil of Fort Barrancas required a little creative reworking to become productive. Sternberg bought topsoil, which was brought in by schooner, and obtained a special bluegrass seed advertised to develop into a lush lawn with appropriate care. With a shovel, rake, and wheelbarrow, the Sternbergs landscaped their property, planted seed, and adorned their yard with several horticultural curiosities from the nearby Grand Bayou. A green oasis emerged among the otherwise desolate yards of the garrison.<sup>15</sup>

Martha helped relieve the tedium of garrison life by raising chickens—an activity

engaged in by many officers' wives at small army posts during this era—and making frequent trips to her family in Indianapolis, while her husband concentrated on his yellow fever manuscript after routine medical duties were completed. The long hours of study and contemplation now began to take shape, and Sternberg crafted a paper that supported his belief that the etiologic agent of yellow fever was a living microorganism. He began with the premise that the current theories of yellow fever causation—the “non-contagionist” or belief in a local origin and the “contagionist” or belief in an importation of the disease—were untenable because they did not “explain all of the well-attested facts” of yellow fever.<sup>16</sup> He acknowledged the three agents considered as likely etiologic candidates by the medical community:

1. a volatile inorganic matter;
2. a lifeless organic matter that catalyzes substances in the earth or atmosphere into the yellow fever poison; and
3. a living germ, which under favorable environmental conditions (heat, moisture, and so forth) will rapidly multiply and acting—directly or indirectly—on other substances convert them into “the efficient cause of disease.”<sup>17</sup> He then presented his hypothesis “the poison [of yellow fever] is of the latter nature, [and] is ... the only theory consistent with the observed facts in regard to the origin and propagation of the disease, and upon it all the otherwise contradictory facts are reconcilable.”<sup>18</sup> To support this hypothesis, Sternberg submitted six propositions with proofs based on the Governors Island epidemic:
  - a. *Transmission from person-to-person did not occur.* Individuals in Castle William, the arsenal, and Fort Columbus had free communication with infected persons during the early part of the epidemic, but only a few persons in Castle William and the arsenal became ill, and soldiers in the Fort Columbus garrison proper escaped entirely. Although many New York citizens who visited the island before the quarantine became ill, no new cases were reported in the city. Most significantly, none of the staff at the quarantine hospital became ill.
  - b. *Yellow fever is not an inorganic substance generated by atmospheric or telluric influences.* Varying atmospheric conditions had to exist on the island, in the harbor, and in the cities of New York and Brooklyn for this to be true, and a seasonal recurrence of the disease would be expected. Neither of these conditions was seen. If the agent were an inorganic substance generated from decomposing matter or other filth, it would need a source on the island. According to Sternberg, the island was in excellent sanitary condition.
  - c. *Yellow fever poison is portable in ships, goods, clothing, and so forth, and a minute quantity is capable of producing a large effect.* Importation of the disease was an accepted fact, and most epidemics began with a



few cases at a point of entry and then expanded. He also contended that an imported inorganic agent would produce only a limited effect. However, if the agent was “capable of self-multiplication, or, in other words, endowed with life, as in the case of the yeast plant, then its action is only limited by the supply of the material [human beings] acted upon...”<sup>19</sup> He also stated that “strong evidence”<sup>20</sup> exists to implicate any type of decaying timbers as a source of “preservation and increase of the germ.”<sup>21</sup> He concluded that the Governors Island epidemic appeared to have no point of entry, which was a surprising comment because numerous yellow fever-laden ships had entered the harbor in the summer of 1870. One can only surmise Sternberg was looking for—and could not find—a clearly identifiable single point of entry for the infection on the island.<sup>22</sup>

If these three propositions were true, Sternberg stated, “the necessary inference is that it is capable of self-multiplication which is a property of living matter,”<sup>23</sup> and that the argument was “reduced by exclusion to the supposition that a specific living germ is the cause of yellow fever.”<sup>24</sup> His last three propositions were evidence that the germ theory supported the facts in regard to the origin and transmission of the disease.

- d. *Yellow fever is completely destroyed by temperatures of 32° F or less, an admitted fact as evidenced by past history.*
- e. Yellow fever poison may remain dormant for an unknown length of time. In southern cities, sporadic and late-occurring cases of yellow fever that appeared to have milder manifestations could not be accounted for by importation or freezing temperatures. The concept of a dormant stage in the agent's life cycle appealed to Sternberg as a viable explanation for these cases. He said it had a milder nature because the agent was not native to the United States, and its virulent character and reproductive abilities declined over time.
- f. *The risk and severity of disease depend upon age, sex, temperament, previous habits, acclimation, and the concentration of the poison to which one was exposed.* Although Sternberg did not doubt the importance of demographic factors, he was convinced a dose-response effect occurred. The first cases on Governors Island all came from the same house and were severe; whereas those cases among the bandsmen in the South Battery were milder. Sternberg also hypothesized that this same dose-response effect and individual susceptibility governed the acclimation process, and, therefore, acclimation (immunity) was not absolute after every case of yellow fever. For acclimation to occur, an individual had to be not only susceptible, but also exposed to a concentrated enough dose of poison to generate a protective effect. If the person was not sufficiently susceptible or the dose was too dilute, then exposure to a more concentrated dose of poison in the future could produce the disease.<sup>25</sup>



He summarized his conclusions: "Yellow fever is an infectious disease, produced by the action upon the human system (directly or indirectly) of a specific living germ, which finds the conditions essential to its multiplication, external to the human body. The germ is an exotic to the United States and is destroyed by a freezing temperature, but may sustain its vitality for an indefinite length of time at temperatures too low for it to increase, and will regain its reproductive power when subjected to a continued temperature of about 80°."<sup>26</sup> The article, "An Inquiry into the Nature of the Yellow Fever Poison, with an Account of the Disease as it Occurred at Governors Island, New York Harbor," was published in the *American Journal of the Medical Sciences* in April 1873. It was well received by the readership if the opinion of Dr. Herron, a Pensacola physician, that Sternberg's ideas were "well expressed" was representative of his medical colleagues.<sup>27</sup>

The significance of Sternberg's first contribution to the medical literature does not lie in the originality of its hypothesis or in its conclusion. The concept of a living organism—most probably a fungus—as the agent of yellow fever can be found in the references he used—LaRoche, Dowler, Reynolds—as well as others of the time, such as Dr. George Wood's *Treatise of Medicine* (1858 edition). With the exception of destruction by freezing temperatures, none of his propositions was beyond reproach. Although well thought out, they were based for the most part on Sternberg's opinions and not scientific proof. Even the most patently obvious point of the paper—that yellow fever is not transmitted from person-to-person—was challenged by Dr. Herron. However, Sternberg demonstrated an ability to put well-considered medical ideas on paper in a cogent manner for the first time in his career. His own experiences provided the basis to support a radical idea that was beginning to stimulate considerable debate in the medical centers of Europe and the United States. Just as he had been anxious to show his inventive powers in Kansas, he now desired to show his analytical powers to his medical colleagues and, simultaneously, took a stand on a contentious issue.<sup>28</sup>

On the morning of September 23, 1873, yellow fever became more than a hypothetical problem for Sternberg. Private Ferrell, who was a patient being treated in the Barrancas Hospital for anemia, had experienced a chill that was followed by fever, nausea, and head and flank pain. The following afternoon, Private King reported with the same symptoms. Sternberg believed them to be suffering with remittent fever—malaria—but, by the evening of September 25, the hoped-for remission in fever had not occurred. Doubting his original diagnosis, he thought that yellow fever was now at Barrancas. A rather simple and dependable examination of urine specimens for the presence of albumin soon verified that Ferrell and King had yellow fever. The next morning Mrs. Schwartz, an enlisted wife and the Sternbergs' cook, told him she had been up all night with two very sick children and asked for him to examine them. After doing so, he was convinced an outbreak had begun and that the post hospital was the center of infection.<sup>29</sup>

Yellow fever had been making its rounds along the Gulf coast since July. New Orleans had seen cases, and physicians at the Marine Hospital in Pensacola reported

their first case, a fatality, on August 14. Two days later, the commander of the Navy Yard established a quarantine to preclude any contact between those two cities and the military installations on the small peninsula in Pensacola Bay. All incoming mail was fumigated with sulfuric acid gas before it was distributed. New recruits arriving from Pensacola were stopped by marines guarding the bridge over the Grand Bayou, stripped bare, and washed down in a carbolic acid bath before proceeding on to Fort Barrancas. Sternberg was confident that all preventive measures had been taken, but as he stated later, "While thus keeping my eye on the outposts, the enemy by a strategic movement...got possession of my citadel."<sup>30</sup> According to Sternberg, the strategic movement was accomplished in a barrel of potatoes. At the direction of the Navy Yard commander, provisions from New Orleans were deposited on a flat boat in Pensacola Bay, a safe distance from the Warrington wharf, and secured later by merchants in the town. The potatoes had been brought into the hospital on August 15 and dumped onto the storeroom floor where they had been picked over. Rotten potatoes had been tossed over the fence surrounding the hospital in the direction of the Schwartz home. Sternberg therefore assumed, since the vegetables came from a known point of infection aboard a vessel most likely infected as well, that they too carried yellow fever germs. He reported to the surgeon general that, while another explanation may become evident in the future, he found "nothing improbable" with this chain of events.<sup>31</sup> He also reported the yellow fever to the post commander, Major John M. Brannan, and recommended the garrison move to Fort Pickens on Santa Rosa Island. Brannan's experience with the disease during the Mexican war left him in little doubt of its potential severity. Before the day ended, steam tugs and a sloop from the Navy Yard had transported the majority of the 144-man garrison to the island in Pensacola Bay. Brannan, the Sternbergs, the hospital staff, some enlisted personnel in the quartermaster's stables, eight hospital patients, and an officer recovering from typhoid fever remained on post. For the next week, the hospital was repeatedly fumigated with sulfuric acid gas and washed down with carbolic acid solution. Eleven soldiers, who were infected before the garrison was removed to Fort Pickens, were eventually brought back to the hospital as they became ill. There were a total of 28 cases of yellow fever—12 enlisted men and 16 civilians on post—of which 4 soldiers, including Private Ferrell, and the 2 Schwartz children died. The results could have been much worse. The expeditious move to Santa Rosa Island limited the attack rate to 11 percent among the command. The case-fatality rate was only 22 percent, a statistic Sternberg could be pleased about when he compared it to the nearly 37 percent suffered at Governors Island two years before.<sup>32</sup>

By the spring of 1874, Sternberg had been an assistant surgeon for 13 years and a captain for eight years. He had been entitled to and nominated for promotion to major and surgeon on February 22, 1869. However, the Senate did not take immediate action on the nomination, and two weeks later a new army appropriation bill was approved. The bill prohibited any new appointments or promotions in the Medical Corps and in many other staff corps until further legislation was enacted. The delay was frustrating professionally, but more significantly it meant no increase in pay. Sternberg was not alone in his frustration. Thirteen other medi-

cal officers, including Charles B. White and Joseph J. Woodward, had also been deprived of promotion by the neglect of the Senate, even though Surgeon General Barnes presented well-founded arguments for their promotions. Patiently, Sternberg, White, and Woodward waited, and two years later, in February 1871, their names were again submitted for promotion. In the nomination, President Ulysses Grant also stated it was only just that the promotions and pay that should be made retroactive to February 1869. This nomination was also made late in the Senate session and suffered the same fate as the earlier nomination. The next army staff corps reorganization was approved in June 1874. The act restored promotion in the Medical Corps, but all existing vacancies in the grade of surgeon were abolished. This was more bureaucratic frustration than the three medical officers could tolerate. Over the next six months, they successfully lobbied Surgeon General Barnes and the Secretary of War, William W. Belknap, for support in their petition of grievances for presentation to Congress. Sternberg's attention, however, was abruptly redirected to Florida by events that had transpired in Pensacola.<sup>33</sup>

The American bark, *Elmira Combs*, fresh from the Panamanian isthmus, entered the Pensacola Bay quarantine station in mid-August 1874. It anchored between the Spanish ship, *Virtuoso*, and the German bark, *Laura Maria*, both of which had crews devastated by yellow fever. Although the American crew suffered with malaria, they were—at that time—free from yellow fever. Presumably, the crew of the *Elmira Combs* had no direct contact with those of the other two ships, for she was permitted to continue to the Pensacola wharf after only five days at the station. During those days, the pernicious cargo brought from Cuba by the Spanish and German vessels easily found its way into the wardrooms, berths, and hold of the *Elmira Combs*. On August 21, her infected crew came ashore to the watering holes along the city's dock. Most of them obtained lodging at Kelley's boarding house for sailors, and it was there on the following day that the first tar (sailor) was taken ill with yellow fever.<sup>34</sup>

As the epidemic became established in the city, cases of yellow fever were also being seen at the Navy Yard. Captain James F. Baker, U.S. Marine Corps, had visited Pensacola and became ill on August 17. Eight days later, one of his men died and three more Marines fell ill. Diagnostic confusion, generated by the combination of malaria and yellow fever, among the navy surgeons there resulted in Navy Surgeon John B. Ackley asking Sternberg to consult with them in late August. After making rounds on all of the patients, Sternberg declared them ill with yellow fever and urged all well personnel be moved to safer ground. Although Ackley agreed, he anticipated difficulty in convincing the commander of the yard, 55-year-old Commodore Melancton B. Woolsey. The commodore received the surgeons courteously and listened to their concerns, recommendations, and Sternberg's repeated appeals to vacate the Navy Yard. But this traditional old sailor was not convinced of imminent disaster. Even if he were, Woolsey stated, he could "not give such an order, it would seem cowardly on my part, it would be equivalent to deserting the ship."<sup>35</sup> The commodore instituted the same strict military quarantine, as previously, but by then yellow jack had already gained a foothold in the Navy Yard.

One week later, Sternberg reported to Brannan after returning from the navy hospital: "I have reliable information that a death from yellow fever occurred at the navy yard last night, and that there are four more cases [one of which was Surgeon Ackley] reported by the surgeon-in-charge. Two of these cases I have seen, and I confirm the diagnosis. I...respectfully recommend...all intercourse with the naval reservation be discontinued, and...the garrison...be moved into camp on Santa Rosa Island, as an absolutely protective quarantine between army and navy reservations is practically impossible."<sup>36</sup> Brannan did not share his navy colleague's qualms about running from an enemy he could neither see nor control, and the garrison encamped once again at Fort Pickens. Only two personnel in the command became ill and both of them recovered.<sup>37</sup>

Fortunately for Sternberg, Martha was visiting her family in Indianapolis when the epidemic struck. On September 11, he wrote, "I cannot think of allowing you to come until all danger from yellow fever is over."<sup>38</sup> She did not hear from her husband until he telegraphed her some days later. Word of the epidemic spread like wildfire throughout the surrounding counties and neighboring states. People were fearful that the disease could be transported on or in almost any object, and Woolsey reported to G. M. Robeson, Secretary of the Navy, that railroad personnel were dumping mailbags gathered from the Navy Yard, Fort Barrancas, and Warrington at Pensacola Junction. Sternberg had continued for some days to send letters urging Martha to remain in Indiana, but they only accumulated at the junction nine miles from post. Her anxiety increased with no word from him, and her letters, which continued to arrive, were filled with pleadings for permission to come home.<sup>39</sup>

While Acting Assistant Surgeon B. J. Bymer attended to the troops at Pickens, Sternberg assisted the navy in a crisis of growing magnitude. On September 11, Surgeon Ackley died. One week later, Woolsey telegraphed Washington that the "fever [was] not abating."<sup>40</sup> One by one, his ships in the bay were becoming infected. But the commodore would not abandon the ship, nor would he allow anyone else to disgrace the service by such action. Acting Assistant Surgeon George B. Todd became ill and quickly succumbed, as did Sternberg's friend Captain Charles Franklin, along with his wife and two children. By the end of the month, Commodore Woolsey, Acting Assistant Surgeon Miller, Lieutenant Commanders Kellogg and Barclay, Captain Alexander A. Semmes, and every other commissioned officer at the Navy Yard, except for Paymaster William J. Thomsen, were either sick, dead, or convalescing.<sup>41</sup>

Sternberg, who was not immune to the disease, was fully cognizant of the risk he accepted every day at the Navy Yard. In a telegram to Martha, he insisted that she not return, even if he became sick: "In such a case, you must not think of coming here. I forbid it, my dear. I will have telegrams sent to you frequently and will conceal nothing from you... but you must stay at home. It is a disease of such short duration that I would be convalescent or beyond help before you could reach me and after a fatiguing journey you would be sure to have the disease.... I want to see you very much, my dear wife, but we must both exercise the

virtue of patience.”<sup>42</sup> Ever sensitive to her emotions, he softened the stark reality of those lines, “You can not think, my dear...how happy I will be when you are with me again.... It is now a whole month since we parted. A little more than a month must pass before I can let you come back, but that will soon pass away, and then...we will be as happy as possible. So let us look forward to the 1st of Nov. as the time when we are to meet.”<sup>43</sup>

Commodore Woolsey died with yellow fever on October 2, and Captain A. A. Semmes assumed command of the Navy Yard. Unlike his deceased predecessor, Semmes ordered all infected ships to remain at anchor while the rest of the fleet proceeded immediately to the Mississippi River quarantine station south of New Orleans. Ten days later, the epidemic was on the wane, and by the time Navy surgeon James Rufus Tryon arrived to take charge of the naval hospital, only the convalescent remained for care.<sup>44</sup>

This epidemic, like the one at Fort Barrancas the previous year, only solidified in Sternberg’s mind that the yellow fever poison “was capable of self-multiplication outside of the human body.... And that it is not a personal emanation from the bodies of those sick with the disease.”<sup>45</sup> He was also convinced the disease was an imported malady. In discussing the two outbreaks, he wrote: “...after careful consideration of the facts I have not been able to find any other source of infection as satisfactory to my mind, and that the disease did not originate at Barrancas seems almost certain for the following reason: Yellow fever has prevailed in Barrancas but six times in fifty-four years. Its appearance in every instance has been preceded by the arrival in the harbor of a vessel from an infected port.”<sup>46</sup> Sternberg believed in a strict quarantine procedure and proper disinfection of infected vessels as the best preventive methods available. He also noted that a weak link in the quarantine chain, such as the early release from the station by a lackadaisical quarantine officer, improper disinfection of vessels, or the presence of an inadequately controlled town, like Warrington, rendered any quarantine effort worthless. Although this conundrum frustrated Sternberg and his colleagues, he began to focus once again on the pathophysiology of yellow fever. As he studied the available texts and current literature and compared them with the disease’s symptoms and progression he had just observed, he conceived a new theory to explain the action of the yellow fever poison.<sup>47</sup>

Mrs. Sternberg’s return in November re-established the happiness and stability to their home that her husband had predicted. But, just as at Governors Island, she found the epidemic had caused changes that saddened her and intensified the bleak loneliness of the small post. Many of her friends and acquaintances, such as Mrs. Ackley and Mrs. Franklin, were dead, and others had traveled north to convalesce. Sternberg, too, was almost completely preoccupied with yellow fever and resolving his belated promotion. Although efforts to resolve the promotion issue provided a three-week hiatus in Washington in December, it was purely a business trip and did little to dispel her feelings of isolation. Martha understood and supported her husband’s professional endeavors, but her toleration had its limits, which had been reached by the following April. If he would not voluntarily

retreat from his professional labors, then he would have to be gently coerced. They had recently become aware of an Indian burial mound at a place known as Bear Point on the Alabama side of Perdido Bay, and Martha suggested they explore this area. Sternberg agreed because he had not indulged his love of anthropology and natural history since leaving Kansas.<sup>48</sup>

Two days of relaxation in camp and a few hours of digging in the dirt had the effect that Martha desired, but once they returned to Fort Barrancas her husband resumed his studies with renewed zeal. Sternberg had recently become a member of the fledgling American Public Health Association (APHA), and, in the epidemics of the past two years, he found grist for a paper to be submitted to the association. The paper was accepted, and he read it at the second annual meeting of the APHA held in Philadelphia in November.<sup>49</sup>

Sternberg's paper, "An Inquiry into the Modus Operandi of the Yellow Fever Poison," appeared as the lead article in the July 1875 issue of the *New Orleans Medical and Surgical Journal*. A long, and somewhat tedious paper, it still does not flow well in a lucid and logical fashion. Like his first article, the second begins with a challenge to the "opinion of the majority of the [medical] profession" that their theories on the pathophysiology of yellow fever needed revision.<sup>50</sup> The commonly held belief was that the yellow fever poison acted directly on the blood as a ferment (zymosis) and altered the composition of the blood, resulting in the clinical and pathological characteristics observed. This hypothesis led to therapies that either eliminated the poison via the excretory organs or destroyed the poison in the blood. Sternberg commented that the theory of zymosis was only a theory because it had no chemical or physical basis to confirm it, and the success of the common therapies had "never been sufficient to give much support to the theory."<sup>51</sup> He did not follow this challenge with another theory, but instead with a suggestion "that the first and essential effect of the yellow fever poison is to produce a disturbance of the functions of the sympathetic nervous system, and that the grave changes in the blood which occur in the course of the disease are secondary in their nature and result from the arrest of the vital processes (nutrition, excretion, secretion) presided over by the sympathetic [system]."<sup>52</sup>

Sternberg's suggestion came from a critical review of a recent article, "Constitution and Changes of the Blood in Yellow Fever," by Dr. Joseph Jones of New Orleans. Jones' investigations led him to conclude that the yellow fever poison acted directly on the components of the blood and induced continuous changes in them from the time of introduction until fatal termination, although he was unable to find this poison microscopically. Sternberg thought that Jones' observations, which were based on the zymotic theory, were unproven and his reasoning was incorrect. The abrupt onset of the disease without prodromal symptoms argued against the blood being the primary target of the poison (the ferment), and he disagreed that the poison acted on the blood in a progressive fashion. If such were the case, it would not follow that one could remain in good health while these systemic alterations proceeded. He also contended that in support of his belief in a dose-response relationship, if the poison acted as a



ferment in the circulation—capable of self-multiplication during this process—then a small amount of the poison would be sufficient to produce the same severe attacks as a large dose. This did not explain the variations in severity from one epidemic to another.<sup>53</sup>

Sternberg then laid the foundation for his suggestion that the primary target of the poison was the sympathetic nervous system. If Jones could not find the agent, then perhaps he was looking in the wrong place. That the specific agent of the disease was a living organism and probably of fungal origin, Sternberg stated “is now considered probable by many recent authorities.”<sup>54</sup> Fungi reproduce via sporulation. Spores freely circulating in the air could be inspired onto oral mucous membranes or directly into the upper airway; spores could also settle onto articles of food and drink and be directly ingested into the gastrointestinal tract. Once established upon lung or intestinal membranes, heat, oxygen, and moisture provided an excellent environment for growth. Sternberg believed—for reasons he does not make clear—that gastrointestinal ingestion was the most likely method of entry, and this determination would later direct some his investigations of yellow fever. The yellow fever agent was considered to have a variable incubation period, according to LaRoche, from 12 hours to months before symptoms became evident. Although Sternberg believed this period to be much shorter—from hours to a couple of days—it had to be accounted for pathophysiologically. Sternberg made his final hypothetical connection between cause and effect by demonstrating—via the literature—that all of yellow fever’s outward symptoms could be attributed to an irritation and subsequent paralysis of the sympathetic nervous system.<sup>55</sup>

Given that his dissertation was based on erroneous data is wholly inconsequential. The medical knowledge of the time was inadequate to permit anyone to arrive at correct conclusions about the pathophysiology of yellow fever. His ideas—and their synthesis—in this dissertation were well developed. Sternberg gathered the essential pieces of the yellow fever puzzle, analyzed them, joined them in a logical sequence of events, and concluded that they did not support his profession’s commonly held views. Although never shy about stating his opinions, he realized they were just as unproven as Jones’. He avoided being labeled a hypocrite by carefully couching his hypothesis as a suggestion to other investigators of the disease. As he worked through the article, some of the assumptions he would use in his future yellow fever research became solidified. A reflection of Sternberg’s medical experience, personality, and driving ambition to spar in the ring of medical science can be seen in this dissertation.

By the time his literary labors were in print, another epidemic of yellow fever had struck the Gulf coast and was ravaging Fort Barrancas. Quarantine operations had been placed under naval jurisdiction in early July. Commodore George Cooper, the new commander of the Navy Yard, was pleased with this action and believed his marines could maintain a vigilant and proper quarantine. Sternberg had established a reliable communication network between himself and the quarantine officers at New Orleans and Pensacola. Although it did not exactly give him real time information, it had been close enough in the past two seasons to allow him to take



action before yellow fever became established on post. The arrival of the German bark, *von Moltke*, into Pensacola Harbor from Havana on the evening of June 27 showed Sternberg that he had been living under a false sense of security. Anxious to return home, the vessel's pilot decided to avoid the quarantine station, anchored a short distance inside the bar between Santa Rosa Island and Fort Barrancas, and departed for the shore. The *von Moltke* had five cases of yellow fever on board, one of which died en route and another after arriving at the quarantine station.<sup>56</sup>

On July 18, Sternberg was called to see a laundress who had a fever and headache. The following day, the laundress' neighbor reported to the hospital with the same symptoms. On July 20, two more cases appeared. His anxiety rose as no remission of fever occurred in the first two cases, but he admitted it was not until sometime on July 21—a day that brought six more cases—that he was convinced it was yellow fever. Dr. Herron wrote later, "...the fever appeared almost simultaneously in nearly every house in [the] garrison."<sup>57</sup> This was only a small exaggeration. In the three days since the first case, cases had occurred in the company barracks and along officer's row. The report of the dreaded disease generated an immediate response from Brannan and Cooper. The garrison was moved forthwith to Santa Rosa Island. Before they had been encamped 24 hours, it became evident that the transfer had occurred too late. The next day, seven soldiers were returned to the post hospital with yellow fever, and over the following three days, 41 more cases appeared. The outbreak came without warning. No cases appeared in Pensacola or at the Navy Yard. It appeared to one and all that this epidemic would be of a very malignant nature. A strict quarantine was maintained against the post. Special orders issued by the post commander gave Sternberg authority to hire as many nurses and purchase whatever supplies he required, and they directed the post quartermaster to purchase as many coffins and hire as many laborers as necessary to dig graves and bury the dead. The post had become a pariah, shunned by the rest of the world. It would have to survive by its own resources and what supplies those willing to risk death would bring them.<sup>58</sup>

After informing his commander of the situation and telegraphing the medical director, Department of the Gulf, for more medical assistance, Sternberg scurried quickly to his quarters to tell Martha she would have to leave post. Protesting this declaration was futile, but as always she made the attempt. Sternberg remained adamant, and there was a heightened sense of anxiety in his tone as he told her, "I want the garrison to feel that my entire time is at their disposal, for undoubtedly we are to have an extensive epidemic."<sup>59</sup> Martha's sense of loyalty, however, would not allow her to accept the inevitable. The discussion continued until interrupted by an orderly from Brannan requesting Sternberg to report immediately.<sup>60</sup>

The commander had a personal problem similar to Sternberg's. A young friend was then visiting Mrs. Brannan. The girl was nonimmune and terrified to remain on post. Brannan asked if he procured a wagon and driver, would Mrs. Sternberg consent to take the girl with her? Sternberg agreed and told Martha she had to leave and take the nonimmune girl with her. It had also occurred to him that Martha could already be incubating the disease, for he said, "You cannot go north, and I am

not willing you should go far from me. If you are taken ill I will come to you..."<sup>61</sup> Martha capitulated and packed in a rush. The promised wagon, commandeered by an immune captain, arrived loaded with tents, camp equipment, and a month's worth of provisions. After tying Martha's pony to the rear of the wagon, he held her for a moment and then said, "Don't put any water between us."<sup>62</sup>

Although Navy Surgeon General Joseph Beale advised abandoning the yard "the moment the fever becomes threatening," Cooper maintained communications with Brannan.<sup>63</sup> He realized the Navy Yard was the only dependable lifeline that Fort Barrancas had, and he continued to receive and forward supplies to the neighboring post. Cooper's telegrams to the Secretary of the Navy during the last week of July chronicled the horrors transpiring at Fort Barrancas: "women and children stricken down at Barrancas,"<sup>64</sup> "keep strangers away from here, fever raging at Barrancas, sixty five cases, seven deaths,"<sup>65</sup> and "post commanding officer's wife sick, his duties providing for the sick are arduous...ladies and children of the post nearly all down, please inform the Secretary of War."<sup>66</sup>

With Martha out of harm's way, Sternberg devoted all of his energy and concentration to the expanding epidemic. His request for extra surgeons was answered on July 23 when Acting Assistant Surgeon William K. Mandeville arrived and attended to the laundresses and soldiers' families. Two days later, Doctors W. Carson and L. F. Salomon arrived from New Orleans. Carson took charge of the soldiers at Fort Pickens, and Salomon directed the soldiers in the hospital. This left Sternberg to attend to the officers and their families in their homes and supervise everyone else. The small hospital had a 25-bed ward and was expandable to 50 beds. By the evening of July 26, it was overflowing with patients. Civilian members on post were treated in their homes, which kept Mandeville and Sternberg continually on the run making patient rounds. Overworked but indefatigable, Sternberg demanded the same from his assisting surgeons. He also required the surgeons to keep notes as meticulously as possible on as many patients as they could. Nursing care, which was critical in the treatment and recovery of all patients, was the weak link in the medical chain at Fort Barrancas. Sternberg had no choice in those he hired. Exorbitant wages had to be offered to induce those he had to volunteer, many of whom he considered "ignorant and indifferent" about the care they rendered.<sup>67</sup> Hospital Steward Hill, chief nurse and wardmaster, was competent and efficient, but as cases mounted he could not ensure the adequacy of nursing care. Sternberg leaned heavily on him, however, and commented that Hill was "unremitting in his attention to the sick, until he was himself prostrated by the disease..."<sup>68</sup>

Sternberg and his colleagues at Fort Barrancas tried all of the standard therapeutic measures. Initially, cases received quinine to reduce fever, ergotine injections to reduce stomach irritability, and cold body baths. Patients were kept at complete rest, not even allowed to turn over in bed, and covered with blankets for fear that any small draft might jeopardize their recovery or induce a relapse. Brandy and champagne were administered in small repeated doses to stimulate the system. Complications, such as kidney failure, were treated with turpentine stupes, mustard plasters, dry cupping to the loins, and ice water enemas. Sternberg

treated, observed, and treated again, but as the epidemic progressed he was left unimpressed by the majority of their therapeutic efforts. Dr. Jean-Charles Faget of New Orleans had published an article in 1873 that indicated a rising temperature accompanied by a declining pulse rate could be considered almost pathognomonic for yellow fever. Sternberg watched and recorded pulse rates and temperatures carefully with a relatively new medical instrument, the clinical thermometer.<sup>69</sup>

Sternberg only found time to write to Martha twice during the early part of the week. A system for keeping in contact had been arranged before they parted. Martha's memoir is rather enigmatic on this point, but it apparently involved someone from Fort Barrancas, the Navy Yard, or Warrington as a relay. Martha's servant delivered letters to a predesignated dropoff point and retrieved letters from Barrancas. This system worked well for 2 days, until the Pensacola quarantine police discovered her whereabouts. Martha and her party had had a difficult time finding a refuge. It was widely known that yellow fever was at Fort Barrancas, and Martha's driver and her conveyance were obviously army property. Local residents soon realized the origin of the four refugees. They received a cold reception at many homes before they found one kind-hearted soul who took pity on the women and gave them shelter. Martha is unclear about exactly where this was, but it seems to have been about 25 miles, probably north or northeast, of Pensacola. Once their presence had been reported, quarantine officials surrounded the house with a cordon of police. The surveilling officers soon figured out her communication scheme and, although they interfered with it initially, on the fourth day she received a letter. The handwriting on the envelope was not that of her husband, but of his commander. In the brief note, Brannan informed her that Sternberg was seriously ill with yellow fever. He also made it clear that she was not—under any circumstances—to return to the fort, and guards had been posted to ensure she did not do so.<sup>70</sup>

Until July 28, the medical staff had remained untouched by yellow fever. But by noon on this day, both Hospital Steward Hill and the post surgeon were seized with fever. After three epidemics, Sternberg's luck had finally ended. Mandeville took charge of the hospital. Brannan immediately telegraphed Herron in Pensacola for assistance and sent another telegram to Surgeon General Barnes informing him of the situation. Herron arrived at Sternberg's bedside in the late afternoon, where he found him wrapped in blankets, febrile, nauseated, and experiencing intense head and low back pain. Therapy was initiated, but as the hours turned into days, Herron began to despair for Sternberg's life. The work and stress of the past 10 days had fatigued his body, and the high fever and persistent low pulse did not bode well for a favorable outcome. Herron did not sense improvement until August 1; by the end of the day Sternberg had begun to rally. Three days later, Herron wrote to Martha that her husband was "now out of danger" and "clear of the effects of yellow fever."<sup>71</sup> As Sternberg gained strength, Hospital Steward Hill lost his long struggle with the disease—a death Sternberg blamed directly on poor nursing care.<sup>72</sup> By mid-August, the epidemic was waning, but Fort Barrancas had suffered a total of 78 cases and 31 deaths, a case to fatality rate of nearly 40 percent.<sup>73</sup>

Sternberg's recovery proceeded without difficulty, but the residual weakness and

fatigue he experienced took weeks to resolve. He was granted three months of leave to convalesce. Instructions were sent to Martha for her to take the train from Pensacola to St. Louis where they would meet and go home to Kansas.<sup>74</sup>

