

The Indispensable Forgotten Man

Joseph James Kinyoun and the Founding of the
National Institutes of Health



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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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Foreword

Headquartered in Bethesda, Maryland, the 27 Institutes and Centers of the National Institutes of Health (NIH) represent the world's preeminent biomedical research organization. NIH is credited with decades of contributions to global health efforts that have saved millions of lives. As it approaches its 125th anniversary on 27 August 2012, it is worth considering how and for what purpose NIH was established, and how it developed from a one-man, one-room "Hygienic Laboratory" in 1887—in its early years, it was called the "Laboratory of Hygiene" and such other names as the "Chemical and Bacteriological Laboratory"—to the important, independent entity it has since become. Although there is substantial historical documentation about NIH beginning in 1930—the year it was named the National Institute of Health (1–5)—its early history is less well known. Newly discovered research information on Hygienic Laboratory founder Joseph James Kinyoun—supplemented by preliminary information from thousands of briefly examined scientific, personal, and governmental documents, as well as personal effects, photographs, and original laboratory equipment maintained by Kinyoun's descendants—should soon change this. After these materials are examined, archived, cataloged, and made available to scholars, we can look forward to a clearer picture of the dawn of the microbial era in the United States and the founding and early years of NIH. It is a story not just of scientific advances but also of opportunity, politics, war, and the development of a young nation.

This sketch draws upon certain of these new materials to place Joseph ("Joe" as he liked to be called) James Kinyoun (1860–1919) and the Hygienic Laboratory in the context of fast-moving medical discoveries at the end of the 19th century, and to examine the motives, beliefs, intentions, and actions of Kinyoun and the men of his scientific world who created the NIH, and whose accomplishments represent the first steps in writing its history.



Background

In 1793, only 10 years after the Revolutionary War ended, Caribbean ships imported devastating yellow fever epidemics that caused up to 10 percent mortality in major U.S. port cities. Historians claim that these epidemics and the fear they engendered forever stamped the American character. With an extensive coastline receiving ships from four continents, the young trading nation needed to support and enforce quarantine, then under local control, and to hospitalize ill sailors (6). Quarantine—based upon ancient ideas of separating the ill from the well and formalized in the 14th century to prevent pandemic shipborne spread of plague—was such an important civil activity that some state laws made breaking it punishable by death. On 16 July 1798, President John Adams (1735–1826) signed into law a bill modeled on British practices providing for the care of ill sailors, including hospital isolation (1, 2); however, at this point, the law had little to do with quarantine other than providing for patient isolation for communicable diseases in the context of clinical care. Over several decades, this system, which began as a medical insurance program, grew into the United States Marine-Hospital Service (MHS). In 1870, the MHS was reorganized and given a Supervisory Surgeon (later renamed the Surgeon General). The first Surgeon General was John Maynard Woodworth (1837–1879), the medical hero of Union General William Tecumseh Sherman’s (1820–1891) Civil War “March to the Sea.” The National Quarantine Act of 1878 gave the MHS substantial quarantine authority and an epidemic disease surveillance system to coordinate with state and local quarantine operations. This was followed by a number of supplementary acts, including an 1890 act authorizing interstate disease control and an 1893 act extending MHS authority over all infectious diseases (1, 2).

Because the causes of epidemics were unknown in the early 19th century, preventing disease introduction was a national priority. The dawning of the microbial era late in the century dramatically changed medical practice, public health, and quarantine. Since the 1830s, microscopists had been examining plant and animal disease specimens, suggesting a link between several fungi and protozoa and human skin conditions. Others had been producing diseases by animal inoculation. Casimir Davaine (1812–1882) spent 25 years researching anthrax, and in 1863 applied

the term “bacteria” (“bactéries,” from a general morphological term of Ehrenberg, 1838) to describe the living organisms he associated with that disease (7). Building upon Davaine’s work, Robert Koch’s (1843–1910) 1876 description of the life cycle of *Bacillus anthracis* represented the first human infectious disease established by new microbiological criteria (“Koch’s postulates”) (7–9). Most physicians and scientists did not appreciate the implications of these breakthroughs until 1882, when Koch identified the cause of tuberculosis (10). (Prominent American physician Austin Flint, Sr. [1812–1886] rushed excitedly into instructor William Henry Welch’s [1850–1934] bedroom screaming, “I knew it! I knew it!” as he waved the newspaper account of Koch’s discovery.) The next three decades, among the most groundbreaking in medical history, revealed the long obscure etiologies of the most important epidemic diseases: malaria and typhoid fever (1880); tuberculosis (1882); cholera, diphtheria, tetanus, and pneumococcal pneumonia (1884); and botulism, plague, and the first “filter-passing agents,” including viruses (1894). Vaccines, passive immunotherapy, and specific antimicrobial therapy would be developed, and clinical diagnosis, the epidemiology of communicable diseases, and other public health activities, such as quarantine, would be placed upon a solid biological basis. It was the most sweeping revolution medicine has ever seen.



Kinyoun's Early Years

Around 1877, when there were few practicing microbiologists anywhere in the world and none in the United States, Joe Kinyoun (rhyming with “pinion”; other relatives spell it “Kenyon”), a 16-year-old boy from remote western Missouri, began to study medicine with his father, who was a general practitioner. Kinyoun was not an ordinary boy and not from an ordinary family. Raised in the same North Carolina hill country that had once been home to frontiersman Daniel Boone (1734–1820), Kinyoun’s father, John Hendricks Kinyoun (1825–1903), was a man with a “peppery temper” (11) who may have been part Native American, possibly Cherokee; Joe Kinyoun’s mother, Bettie Ann Conrad (1835–1872), seems to have been part Cherokee as well (12). (Kinyoun later wryly observed: “Instead of being a Celt I am an Indian” [11]). Somehow John Hendricks Kinyoun managed to escape his wilderness environs to study at Wake Forest College (Winston-Salem, North Carolina), Columbian College (Washington, DC), and Union College (Schenectady, New York, from which he graduated with honors). After four years of teaching school and apprenticing under North Carolina Chief Justice Richmond Mumford Pearson (1805–1878), John Hendricks Kinyoun ended up with both a master’s degree and a law degree. He then went off to study under America’s preeminent surgeon, Valentine Mott (1785–1865), receiving a medical degree in 1859, with honors, from University Medical College, New York. John Hendricks Kinyoun was not the first adventurous Kinyoun; his grandfather, born outside London in 1756, had immigrated just after the Revolutionary War broke out to enlist at age 18 or 19 under General George Washington (1732–1799) (13, 14). He eventually became Assistant Quartermaster in the Continental Army.

Shortly after Joe Kinyoun’s 1860 birth in East Bend, North Carolina, the Civil War broke out. A slave owner, John Hendricks Kinyoun left his wife, his son Joe, a 3-year-old daughter, and his slaves to join the Confederate Army (Figure 1) (12). Yadkin County, North Carolina, was then a somewhat remote hill area of 10,714 residents, four flour/meal stores, one tobacconist, one tinsmith, and 22 liquor stores. It was mostly non-slaveholding, antiwar, and almost evenly split politically, albeit with a slight pro-Union tilt. Appointed Captain and Commander of Company F, 28th Regiment, John Hendricks Kinyoun fought in 13 (family archival

materials indicate 17) successive battles beside two of his brothers-in-law, not as a physician but as a combatant. He avoided further direct combat—in particular the Battle of Hanover Courthouse in May 1862, where some of his former Company was captured, and the Battle of Gettysburg, where more North Carolina soldiers fell than from any other state—by resigning as Captain on 28 March 1862. After more than a year working at Richmond’s Winder Hospital, he joined the newly formed 66th Regiment as an Assistant Surgeon. Serving in the hospital at Richmond, Virginia, John Hendricks Kinyoun was present at the battles of Cold Harbor and the siege of Petersburg (12–15). At the end of the war he surrendered, with most of the 66th, to General Sherman at Durham, ironically placing him in the same place and at the same time as Union physician and future MHS Surgeon General Woodworth, who served under Sherman. Although it is not inconceivable that the two men met, no record of such a meeting is known.



Figure 1. Joseph James Kinyoun during his lifetime. A. John Hendricks Kinyoun, LL.D., M.D. (1825–1903), holding his son Joseph James (1860–1919), apparently photographed in mid-1861 (12). The elder Kinyoun fought as an Assistant Surgeon with the Confederate Army during the Civil War, and is seen in Confederate Army uniform. B. Kinyoun as a young man, undated, probably about 1884. C. Kinyoun in MHS uniform, 1886. D. A Kinyoun self-photograph, undated, possibly around 1890. E. Kinyoun in U.S. Army uniform during World War I, early 1918.

An extended verse of the Confederate anthem “Dixie” praises the war exploits of John Hendricks Kinyoun and his “boys” of the 28th (15); his “pocket” (or “field”) surgical kit is at the National Museum of Health and Medicine (16). Among the few slaveholders in Yadkin County, John Hendricks Kinyoun was a pragmatist who fought beside slaves and whose views about slavery changed as the war dragged on and the Emancipation Proclamation rocked North Carolina politics. He is said to have eventually developed a “wholehearted commitment to independence” of slaves (17), and looked optimistically toward a better postbellum nation. After the war, his medical practice included ex-slave patients. During his four years away, John Hendricks Kinyoun wrote dreamy letters to his wife, longing for the war to be over, to see “little Joe,” and to hear him talk. Growing up in the land of Daniel Boone, “little Joe” Kinyoun nevertheless became a self-proclaimed “disciple and follower of the noted David [‘Davy’] Crockett” (1786–1836) (11), a frontiersman from nearby Tennessee whose service and sacrifice Joe Kinyoun may have especially admired.



The war left their homeland destroyed, and the Kinyoun house burned down. The family moved on briefly to Texas and then to the Western frontier, settling in Post Oak Township, south of Centre View (Centerview), Missouri, in 1866, a year after the railroad’s arrival had turned it into an end-of-the-line trading outpost (14). John Hendricks Kinyoun showed up in Centre View with only \$10 and an unpaid debt for relocation expenses (14). Periodically riding off on a pony to see patients who were few and far between, he made a living in his first year in Centre View by splitting 12,000 rails for about a dollar a day (14). After the Civil War, the population of Centre View increased from around 1,600 to more than 2,600. Full of black and white refugees from the Southern States, Centre View, like the rest of the territory where the James Gang and the remnants of Quantrill’s Raiders ruthlessly operated, was a lawless place of violent crime and vigilante lynching (13). At one point, Joe Kinyoun’s physician cousin James barely survived an assassination attempt; at another, a “young colored woman” from Centre View named Laura Kinyoun was brutally murdered. (The relationship of Laura Kinyoun to John Hendricks Kinyoun’s family is unknown; a possible explanation is that after the war, one or more of John Hendricks Kinyoun’s ex-slaves joined him in, or followed him to Missouri, and that Laura Kinyoun was the daughter of that ex-slave.)



Figure 2. Kinyoun and his family moved to Centre View, Missouri, when Kinyoun was 5 years old (1866). At first they lived in a log cabin but eventually were able to afford a home (12, 18). Kinyoun apparently lived in this house as an older boy or teenager, although the dates of his residence are unknown.

Living in a primitive log cabin in a remote frontier area (Figure 2) (12, 18), the Kinyouns nevertheless seem to have been progressive, scholarly, ambitious, independent, and restless. A “common school” (public school) student, Joe Kinyoun got additional training under a “preceptor” and by age 14, he was studying algebra, geometry, and the Greek and Roman classics. He was also speaking French, German, and Spanish, skills that would prove important in his future.

Later in life, Kinyoun attributed his career path to boyhood readings about Louis Pasteur (1822–1895), although whatever of Pasteur’s work may have been available in rural Missouri at the time would not have been about human diseases.

At age 16, Kinyoun passed up college to learn medicine under his father, took a lecture course at the two-year-old St. Louis College of Physicians and Surgeons (1880–1881) (Figure 3), then moved on to Bellevue Hospital Medical College in New York (1881–1882) (Figures 4 and 5), one of the few places in the country offering a solid research experience under medical giants like Austin Flint, Sr., as well as microscopy under one of Flint’s sons, Austin Flint, Jr. (1836–1915). At Bellevue, Kinyoun met several young students, house officers, and instructors who would soon join him as leaders in the (as yet) nonexistent fields of American microbiology and infectious diseases, among them William Henry Welch (1850–1934), Charles V. Chapin (1856–1941), and Hermann M. Biggs (1859–1923) (Figure 6).

Figure 3. The St. Louis College of Physicians and Surgeons opened in 1879. Kinyoun took a course there in 1880–1881, apparently with noted microscopist Frank L. James (1841–1907), and enrolled in New York City’s Bellevue Hospital Medical College later that year.





Figure 4. Bellevue Hospital, New York, in 1879, two years before Kinyoun enrolled.



Figure 5. Bellevue Hospital and Bellevue Hospital Medical College, where Kinyoun received his M.D. degree in 1882; the Medical College was among the nation’s best medical schools, offering research experiences as well as instruction by nationally and internationally renowned professors. Before the landmark 1910 “Flexner Report,” U.S. medical education was of mixed and often poor quality. Some medical schools offered only brief courses that lacked clinical and pathological training, and some of these were held in such locales as drug stores. The Flexner Report, which recommended strengthening U.S. medical education, was led by Abraham Flexner (1866–1959), younger brother of Kinyoun’s friend Simon Flexner, whose unrelated “Flexner Commission Report” in 1901 on the existence of plague in California exonerated Kinyoun of charges by California Governor Henry Gage (see Figure 6).



Figure 6. Some of the key figures in Kinyoun’s professional life, assembled for a Rockefeller Institute meeting. Throughout his career, Kinyoun interacted substantially with most of these men. Pictured at a meeting of the Board of Directors of the Rockefeller Institute for Medical Research are, from left to right: Simon Flexner (1863–1946), Theobald Smith (1859–1934), Hermann M. Biggs (1859–1923), William H. Welch (1850–1934), T. Mitchell Prudden (1849–1924), Luther Emmett Holt (1855–1924), and Christian A. Herter (1865–1910).

Graduating in March 1882— John Shaw Billings (1838–1913) gave a hilarious commencement address that closed with the sober challenge: “the eyes of the world are upon you” (19)— Kinyoun practiced medicine for a few months in New York City while taking postgraduate courses in analytical chemistry, toxicology, surgery (under Frederick Augustus Castle [1842–1902]), and gynecology (under Joseph Decatur Bryant [1845–1914]) (20). Back in Missouri by December 1882, the loss of his first patient—a little girl who died of (probable) diphtheria, among the deadliest of childhood diseases—so depressed him that he considered quitting medicine altogether, writing his mother, “[I] am literally worn out” (18). Instead of quitting, he taught with his father in the Centre View Academy school while helping him in his “active country practice.” He made medical visits for mostly minor complaints, seeing children and pregnant women (\$1 a visit and \$10 a delivery), taking on some of his father’s debtors as patients (21), and marrying a local beauty, Susan Elizabeth (“Lizzie”) Perry (1860–1948), the granddaughter of prominent Missouri pioneers. Their first child, Bettie, was born a year later, and they subsequently had four more children.

During this period, Kinyoun somehow obtained a microscope, which at the time was an expensive gadget usually purchased by well-off hobbyists examining such natural sources as pond water. In between patients and classes, he used it to make studies concerning such agricultural diseases as anthrax, chicken cholera and “swine plague” (both caused by *Pasteurella multocida*), and later human erysipelas and osteomyelitis (20), apparently making him the only autodidact of the tiny group of American founders of bacteriology. By 1885, Kinyoun was ready to move on. Where three years earlier there had been few if any bacteriology laboratories in the United States and no bacteriology positions, the situation was now changing. Philanthropist Andrew Carnegie (1835–1919) had just funded a Bellevue laboratory for pathologic and bacteriologic research, to be run by Kinyoun’s old professors Frederick (“Fred”) Shepard Dennis (1850–1934) and Edward G. Janeway (1841–1911). Although apparently still lacking practical bacteriologic experience, the 26-year-old Hermann M. Biggs, Kinyoun’s medical school friend, was the new bacteriology instructor.

Kinyoun and Biggs were on the cusp of a revolutionary new era of microbiology; William Thompson Sedgwick (1855–1921) later recalled that: “The word ‘bacteriology’ had appeared before 1886 but the subject had no existence anywhere much before that time . . .” (22) Charles-Edward Amory Winslow (1877–1957) called the 1880s “the most wonderful decade in the history of medicine” (23). Microbiology’s arrival caused a revolution, and Kinyoun found himself in the right place at the right time. He returned to New York as the Carnegie Laboratory’s first bacteriology student, specifically to study cholera (20), the cause of which had (arguably) just been discovered by Koch (24), but which was not then prevalent in the United States.



The Marine-Hospital Service

Since neither the MHS nor any other federal agency had a bacteriology laboratory capable of studying human diseases, it is unclear what motivated Kinyoun's next career move, to join the MHS. It is conceivable that his last-minute New York retraining on the specific subject of cholera, his MHS appointment, and his subsequent MHS assignment had somehow been prearranged. In 1885–1886, MHS Surgeon General John B. Hamilton (1847–1898) was engaged in responding to popular demand for a national public health system by building up the MHS and trying to favorably position it over a competing federal agency, the National Board of Health (2, 25). Hamilton's right-hand man in these efforts was Joe Kinyoun's uncle, MHS Surgeon Preston Heath Bailhache (1835–1919) (Figure 7), friend of the late President Lincoln and physician to Lincoln's children. Whatever the circumstances surrounding Kinyoun's interest in the MHS, Hamilton undoubtedly saw the new discipline of bacteriology as a way to advance the Service's prospects and establish a new level of certainty in making quarantine decisions. Cholera was among the top MHS priorities; Hamilton had just cowritten a book on the subject that emphasized the importance of "bacterioscop[ic]" diagnosis (about which he had apparently just become familiar) as well as essential laboratory equipment and techniques for cholera isolation (26).



Figure 7. Preston Heath Bailhache (1835–1919) was Kinyoun's uncle and a powerful senior physician in the MHS. It is conceivable that he encouraged or arranged for Kinyoun to join the MHS. Bailhache and his brother William were close friends of Illinois presidential candidate Abraham Lincoln. When Lincoln was elected President, William helped him prepare his first inaugural address. Preston Bailhache was physician to Lincoln's children.

In his MHS application, Kinyoun stressed his unique bacteriology experience and submitted supporting letters from his old professors Dennis and Flint, from Biggs, from a colorful physician/microscopist/adventurer and Confederate bombmaker, and from two prominent politicians

(Figure 8). For good luck, Kinyoun also brought a rabbit's foot to his 5 April 1886 MHS exam, later claiming, according to one source, that it helped him score “at the head of [his] class of seven or eight” (25). (MHS records document a score of 73.6 percent, barely a passing grade, placing Kinyoun fifth out of nine applicants [20]). Kinyoun remained on a waiting list for upcoming MHS vacancies, and when a position became available a few months later, he took it.



Figure 8. In his 1886 MHS application, Kinyoun stressed his unique bacteriology experience and sought support from prominent academicians, politicians, and one colorful adventurer. In addition to letters from his old professors, Frederick Shepard (“Fred”) Dennis (1850–1934) and Austin Flint, Sr. (1812–1886) (upper left and upper right, respectively), he also sought the support of his Missouri neighbor, Senator and former Confederate Brigadier General Francis M. Cockrell (1834–1915; lower left), as well as Governor and Union war hero Colonel Thomas T. Crittenden (1832–1909; lower right). (Crittenden had become notorious for [allegedly] arranging the extra-legal assassination of Jesse James by Robert Ford, then pardoning Ford after his murder conviction). Kinyoun also got supporting letters from fellow Bellevue student and friend and later bacteriology instructor Hermann M. Biggs (1859–1923; top center), and a professor of chemistry and toxicology during his 1881 St. Louis course, the colorful microscopist and inventor Frank L. James, M.D., Ph.D. (1841–1907; center), who had trained in Germany under chemist and infectious disease theorist Justus von Liebig (1803–1873) before becoming a spy, bombmaker, and terrorist for Confederate President Jefferson Davis (1808–1889).

The Hygienic Laboratory: Abutment

With cholera importation again a looming threat to America, Kinyoun entered the MHS on 4 October 1886 (Figure 9) (11, 25, 27) in a key position at the Staten Island quarantine station, the most likely port of entry for exportable European infectious diseases like cholera. The life of an MHS officer in this era was typically one of adventure but also of danger, with many officers dying in the line of duty, especially from yellow fever and other infections they were trying to contain. As was customary in the MHS, and probably as a legacy of the secretive former military man/MHS Surgeon General Woodworth (11), Kinyoun received a code name he carried with him throughout his MHS career: Abutment. The New York quarantine station hospital (still standing as of 2012) was a facility newly rented from the Marine Society (Figures 10–14) (28–33), the entire station having just been relocated from Bedlow (Bedloe) Island (now called Liberty Island) to allow construction there of the Statue of Liberty. Hamilton quickly set up the nation's first federal bacteriology laboratory in a museum room and placed the 26-year-old newcomer in charge of it (2, 28, 29). Kinyoun opened up shop in August 1887 (2, 28, 29)—apparently on August 27 (33), the beginning of the NIH.

Kinyoun's 16-year MHS career corresponded with the emergence and growth of American microbiology and epidemiology and an MHS-influenced expansion of national public health. The Hygienic Laboratory began as a diagnostic laboratory supporting MHS quarantine activities against the (then) four quarantinable epidemic diseases: cholera, yellow fever, smallpox, and plague. At the time, cholera and yellow fever were the biggest of these threats; cholera was potentially the most amenable to new approaches due to Koch's 1884 isolation of a putative causative organism (24), which allowed for patient diagnosis and environmental detection using bacteriologic techniques. Especially during the warm weather "quarantine season," American consular offices around the world would cable the MHS about outbound ships that might harbor any of these quarantinable diseases, or which had left ports with ongoing epidemics. MHS officers in U.S. ports would then meet and inspect the ships, examine patients, conduct epidemiological investigations and, if necessary, quarantine and fumigate the ships, cargo, and ballast while disinfecting and isolating ill and well passengers, clothes, possessions, and mail (34).



Figure 9. Joe Kinyoun joined the Marine-Hospital Service in 1886 as an Assistant Surgeon assigned to the Staten Island, New York, quarantine station. The time and circumstances of this photograph are unknown, but can be provisionally dated to late 1886 because Kinyoun (front row, left; still bearded as he had been in earlier years) joined the MHS around the time that Truman W. Miller (1840–1900; front row, center) resigned his commission. Miller later became editor of *The Journal of the American Medical Association* following the death of its previous editor, former MHS Surgeon General John B. Hamilton. The Journal supported Kinyoun throughout his career. On Miller’s left is MHS Officer Hiram W. Austin (1850–1932). The other MHS officers have not been conclusively identified. It is noteworthy that Kinyoun, a sophisticated amateur photographer with his own darkroom, is holding the camera flash tripwire in his left hand. Kinyoun took other such portraits and professional quality photographs over the years, often carried a camera around in his pocket, and gave his wife Lizzie the “camera craze” (as he termed it) to the point where she regularly stayed up nights developing and printing photographs (11). He may also have influenced his father to take up the hobby, as suggested by a formal self-portrait in which John Hendricks Kinyoun holds the camera tripwire in his left hand. The above photograph has previously been published but with apparently incomplete and erroneous identifying information (25, 27).



Figure 10. The (eastward facing) front of the Marine Hospital, Stapleton, Staten Island, New York, which housed the Hygienic Laboratory from 1887–1891 (27–29). In 1891 the laboratory moved to Washington, DC, leaving behind a smaller service laboratory. The building still stands (as of 2012) but is unoccupied (Figure 11). The exact location of the laboratory is unknown, but it was in one of the eight apparently identical ground floor rooms in the central part of the building. The windows of four of those rooms are visible above, two on either side of the main entrance. Four additional central ground floor rooms are in the back of the building (see Figure 12). The two men are unidentified but are presumably Marine-Hospital Service officers. It has been speculated that Kinyoun is on the left and station director (later Surgeon General) Walter Wyman is on the right.



Figure 11. The former MHS hospital on Errington Street, Stapleton, Staten Island, New York, now abandoned, as seen from above. The eastward facing front of the hospital is visible in the lower part of the picture. Google satellite photograph, 2010.



Figure 12. The (west facing) rear of the Marine Hospital, Stapleton, Staten Island New York, where the Hygienic Laboratory was located from 1887–1891. Isolation tents for tuberculosis patients are visible behind the building. Kinyoun instituted this tuberculosis isolation, apparently being among the first to do so, and he urged unsuccessfully that other Marine Hospitals follow suit (31, 32).

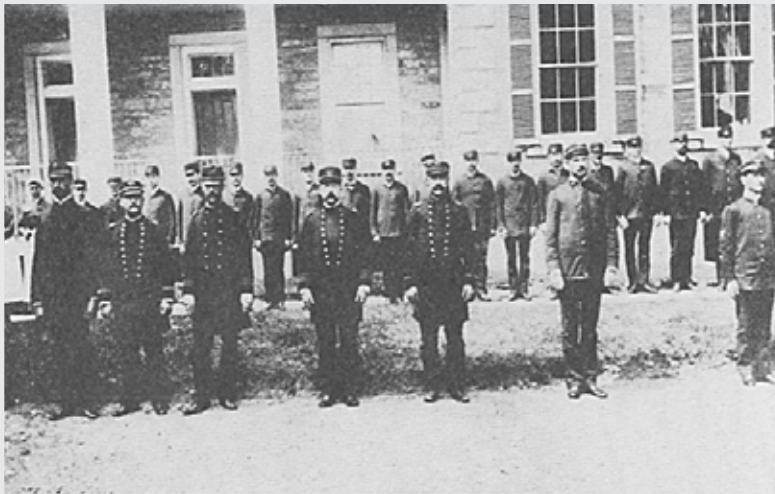


Figure 13. MHS officers (front row, second through fifth men) and other employees, (e.g., stewards, dock workers, and clerks) (first row, first and last two men; all of back row), posed in front of the southern part of the east wing, Marine Hospital, Stapleton, Staten Island, New York, 1887. Kinyoun stands third from the left; Walter Wyman stands to his left (i.e., center). The other men have not been conclusively identified.



Figure 14. The original Hygienic Laboratory on the first floor of the main building of the rented Marine Hospital, Stapleton, Staten Island, New York. The image is undated but was presumably taken between 1887 and 1891. The building is still standing, but is unoccupied (Figure 11). The actual location of this room, in one of eight similar rooms on the ground floor of the central building, is not currently known. The Hygienic Laboratory moved to the 4th floor of the Butler Mansion, adjacent to the U.S. Capitol, in 1891. The two men in the picture have not been identified but neither appears to be Kinyoun, or Wyman, or any of the other early Hygienic Laboratory supervisors, such as Henry Downes Geddings (1859–1913), Ezra Kimball Sprague (1866–1943), or Milton Joseph Rosenau (1869–1946).

Kinyoun had barely set up the Hygienic Laboratory when an Italian ship arrived in New York on 22 September 1887, reporting eight suspected cholera deaths en route; a sister ship followed shortly thereafter with three more deaths en route. Cholera had never been isolated in the United States; indeed, there were only a handful of men who had the knowledge and equipment to do so. Kinyoun's investigation led him to obtain cultures from living and (later) dead autopsied cholera patients that grew cholera vibrios, work which was thereafter confirmed by his friends Edward Orem Shakespeare (1846–1900; Blockley Hospital, Philadelphia), Biggs (at Bellevue), and T[heophil] Mitchell Prudden (1849–1924; at the [New York] College of Physicians and Surgeons) (Figure 6), to whom he had sent the cultures for “blind” confirmation. Only when the three men met to

compare results—all positive—did Kinyoun and his Missouri MHS colleague Samuel Treat Armstrong (1859–1899) report the sensational news of the first bacterial detection of cholera in the Western Hemisphere (35,36). With the coup he had hoped for, Hamilton began boasting about Kinyoun and the Hygienic Laboratory, while gradually expanding its scope. As these events were unfolding, Kinyoun’s 3-year-old daughter Bettie contracted and died of diphtheria (18), her physician father unable to save her. Diphtheria was the same terrible disease that had killed Kinyoun’s New York patient and brought him close to quitting medicine forever. Bettie’s death was a tragedy from which Kinyoun would never fully recover. He poured himself into work. The MHS soon overcame the National Board of Health to survive as the nation’s sole public health agency (2). Within two years, in 1889, *The Journal of the American Medical Association* was calling for a “United States Public Health Service,” an idea and a term still more than two decades away from realization. Even before authorizing legislation was enacted by Congress, Kinyoun moved beyond pure bacteriologic support of quarantine measures, extending his research to other infectious diseases of public health importance.



From 1887 until he stepped down as Hygienic Laboratory director 12 years later, Kinyoun pushed himself and the laboratory rapidly forward as mostly European microbiology breakthroughs created ever more applied research opportunities. He was fully supported by Hamilton and by Hamilton’s successor Walter Wyman (1848–1911) (Figure 15) (37), another officer who had once studied in European laboratories in the pre-microbiology era.

In 1888, the New Orleans quarantine station was reorganized according to Kinyoun’s recommendations, setting the stage for important yellow fever studies of the next decade (38). In late 1888, Kinyoun took an additional three months of laboratory training at Johns Hopkins under Welch (36). Later that year, Kinyoun’s first MHS protégé, Henry Downes Geddings (1859–1913), began running a spinoff yellow fever laboratory in Florida’s Dry Tortugas (Figure 16). When Robert Koch (1843–1910) announced that tuberculin was a cure for tuberculosis in 1890 (39–41), Kinyoun went to Berlin as a visiting scientist—simultaneously chaperoning the family of Lizzie’s cousin, Georgia Sen. Joseph E. Brown (1821–1894)—and became among the first to conclude, based on laboratory and hospital

investigations under Koch's direct supervision and at the Charité and Maobit hospitals, that tuberculin was not the hoped for cure (39, 40). Even so, he helped his German colleagues better evaluate treatment efficacy with modification of clinical study methods to introduce standardized examinations of patients, thereby controlling for type and severity of disease in those who did and did not receive treatment (39, 40).



Figure 15. MHS officer Walter Wyman (1848–1911) served as Surgeon General from 1891 until his death from complications of diabetes in 1911. Kinyoun had been a protégé of prior Surgeon General Hamilton and was already a rising star in the MHS when Wyman, his supervisor at the New York quarantine station, became Surgeon General. The nature of the relationship between Kinyoun and Wyman has been a source of speculation for over a century. There is substantial evidence both for and against the notion that Wyman was unsupportive of Kinyoun although, as a militaristic “by the books” manager, if he had felt any ill will toward Kinyoun, Wyman would probably never have openly displayed it. Although Kinyoun never challenged Wyman’s authority, Wyman may have felt threatened by Kinyoun’s substantial national/international reputation. *The Journal of the American Medical Association*, run for a time by Wyman’s enemy and former MHS Surgeon General Hamilton, repeatedly praised Kinyoun and disparaged Wyman. For example, a Journal editorial called Wyman unfit for his job and another referred to Kinyoun as “Surgeon General Kinyoun.” The two men worked closely together, with Wyman being Kinyoun’s immediate supervisor throughout Kinyoun’s entire 16-year MHS career. During almost the entire period, he seems to have been Wyman’s principal “go to” man; they appear never to have had any official dispute, although Kinyoun claimed that after his MHS resignation, he told Wyman he had a low opinion of his leadership (37).

As he worked in Berlin, Kinyoun sent tuberculin to Geddings with instructions to set up a parallel tuberculin clinical research program in Washington, DC (41). Somehow he managed to retain both his own skepticism about tuberculin and Koch's friendship, conducting a series of experiments under Koch while simultaneously working with Koch's most irritating critic, Rudolf Virchow (1821–1902) (Figure 17). From Kitasato Shibasaburō (1853–1931), the Koch laboratory's fellow visiting scientist from Cambridge, Ernest Hanbury Hankin (1865–1939), and from Paris-based Ilya Mechnikov (1845–1915), Kinyoun learned nascent principles of immunology (40), an even newer field than microbiology. He (correctly) predicted that further breakthroughs were inevitable, “[i]f the [immunological] theories of Kitasato, [von] Behring, and Hankin could be put into practical operation in combating acute infectious diseases by immunizing persons against them . . .” (40). Among the first scientists to fully appreciate the intimate relationship between microbiology and immunology, Kinyoun went on to articulate an early concept of two different components of immunity: innate and acquired immunity. From Berlin, he continued on to Paris to work under Pasteur, learning, among other things, how to produce rabies vaccine.





Figure 16. Three MHS officers helped Kinyoun run the Hygienic Laboratory during the 1890s. Henry Downes Geddings (1859–1913) (left image) was the first to run the laboratory under Kinyoun’s supervision during his absences. Although it is not clear what laboratory training he may have received beforehand, in 1889 Geddings was sent to the Dry Tortugas, Florida, to run the satellite MHS yellow fever laboratory. From December 1890 to May 1891, while Kinyoun was working in Berlin with Robert Koch, Geddings ran the Hygienic Laboratory and received from Kinyoun specimens of “Koch’s lymph” (Old Tuberculin, or OT) with directions for a clinical trial to study its efficacy in treating active tuberculosis. To Koch’s dismay, both Kinyoun and Koch’s Berlin studies and Geddings’ New York studies revealed the treatment to be harmful and of little value. Geddings was formally appointed to the Hygienic Laboratory in 1896 but was replaced by Ezra Kimball Sprague (1866–1943; middle image) the following year, and sent to Europe to bring back “Yellow Jack bugs” (the *Bacillus icteroides* alleged by Giuseppe Sanarelli [1864–1940] to cause yellow fever). William Franklin Elgin (1861–1938) was assigned to the laboratory in 1898, and later went with Kinyoun to the H.K. Mulford Laboratory, where he had a distinguished career and became one of the nation’s top pharmaceutical scientists. Kinyoun had been corresponding with Carlos Juan Finlay (1833–1915) since 1889, when he debunked Finlay’s claim of a bacterial etiology of yellow fever, and he was joined in his skepticism of Sanarelli’s etiologic claim by two future Assistant Surgeons General, his closest MHS colleague, Henry Rose Carter (1852–1925) and Joseph Hill White (1859–1953). Geddings and MHS officer Eugene Wasdin (1859–1911), who later became the first physician to attend to President McKinley after his September 1901 assassination, put their reputations behind the Sanarelli claim, which seems to have caused the MHS some embarrassment. The true etiology of yellow fever remained obscure during Kinyoun’s lifetime, but with the epidemiologic help of Carter, its mosquito transmission was demonstrated in 1900 by another Kinyoun friend, Army Major Walter Reed (1851–1902) and Reed’s research team. When Kinyoun stepped aside in 1899, the Hygienic Laboratory was taken over by Milton Joseph Rosenau (1869–1946; right image), who had worked intensively with Kinyoun on pneumococcal diseases soon after his 1890 entry into the MHS. During his tenure (1899–1909), Rosenau became a visionary director and an important figure in the field of Preventive Medicine. Rosenau’s immediate boss was Geddings, who by then had been promoted to Assistant Surgeon General.



Figure 17. Prominent European colleagues and research partners of Kinyoun. Kinyoun made long trips to Europe in which he studied under Koch, Pasteur, and others in their laboratories, as well as the independent Berlin scientist Rudolf Virchow, bringing back reagents, techniques, and seemingly endless ideas. Koch seems to have taken Kinyoun under his wing, engaging him in lengthy discussions, personally supervising his work, and allowing him to conduct his own research while also working with the Koch team. Kinyoun’s research failed to validate Koch’s claims for the efficacy of tuberculin in curing tuberculosis, Koch’s most humiliating failure. Nevertheless, he seems not to have objected to Kinyoun’s association with Virchow, by then a socialist politician and critic of Koch. Kitasato remained a close friend; later in his life, Kinyoun visited him in Japan and brought back a collection of orientalia that remains in the possession of Kinyoun descendants. In the Pasteur laboratory, Kinyoun seems to have worked most closely with Émile Roux (1853–1933), who remained a valued friend, especially during the U.S. plague importations of 1899–1900, when he arranged to have large quantities of Haffkine prophylactic serum sent to San Francisco, as well as the Danyasz rodenticidal “virus” (see text).



Bringing reagents, techniques, protocols, and ideas back to the United States, Kinyoun turned the Hygienic Laboratory—which moved to Washington, DC, in 1891 (Figures 18 and 19)—into a modern European style laboratory strongly oriented toward research with applied public health and clinical applications, while simultaneously supporting the many ongoing MHS outbreak investigations (Exhibit 1).

Exhibit 1. Kinyoun's first decade (1887–1896) as director of the Hygienic Laboratory. Selected research projects undertaken by Kinyoun and other efforts, organized by the year begun. In addition to these activities, Kinyoun was responsible for running the Hygienic Laboratory and supporting the investigations and diagnostic needs of the other MHS officers stationed across the country and abroad. Dates are approximate in some cases. See monograph text for additional information and references.

1887—Studied cholera diagnosis and growth properties in sea water; urged hospital isolation of tuberculosis patients; began work that debunked Carlos Finlay's claim for a micrococcal etiology of yellow fever but began correspondence with Finlay and was eventually persuaded by Finlay's theory of mosquito transmission.

1888—Studied microbial disinfection with steam/pressure and later sulfur and formaldehyde; began invention of multiple disinfecting machines.

1889—Studied bacteria on hands, nosocomial transmission by health care workers, and epidemiology of pneumococcal pneumonia and hospital carriage epidemics; identified role of pre-outbreak bacterial colonization in institutional epidemics; developed early credible theory of why pneumococcal epidemics usually occurred in winter.

1890—Studied yellow fever etiology, pandemic influenza, malaria, and lack of efficacy of cobra venom as cholera treatment.

1891—Proved lack of efficacy of tuberculin in treatment of tuberculosis; produced rabies vaccine; prepared first pneumococcal vaccine and first pneumococcal immune serum; studied "enteric fever"; studied contamination of potable water and water safety standards.

1893—Helped prepare new federal quarantine regulations; set up Hygienic Laboratory exhibit at the World's Columbian Exposition ("Chicago World's Fair").

1894—Was first American to study newly discovered plague bacillus; studied new diphtheria antitoxin in Berlin, Paris, and Washington, DC; became first to prepare and test smallpox immune serum in humans; conducted study of ventilation of U.S. House of Representatives; began three-month laboratory instruction course for MHS officers. Cohosted Convention of American Bacteriologists, first national organization of American microbiologists, followed four years later by the Society of American Bacteriologists (now the American Society for Microbiology); served as President in 1909.

1895—Warned about plague importation to United States; increased outbreak investigations related to general public health and unrelated to quarantine or marine issues; worked on typhoid fever.

1896—Conducted studies to distinguish variola from vaccinia; researched malaria; worked on streptococcal vaccine; began plague research program; worked on disinfection of railway coaches; was active against anti-vivisection movement; taught courses to civilians in Hygienic Laboratory.



Figure 18. The Butler Mansion, at the corner of B Street and 3rd Street Southeast, Washington, DC. The MHS moved to this building in 1891, and the Hygienic Laboratory occupied the entire 4th (upper) floor. The view from B Street windows looked directly across the street at the South end of the U.S. Capitol. The Butler Mansion had served as a temporary White House during the administration of president Chester A. Arthur (1829–1886), but by 1891 had been converted to office space for the MHS and other federal agencies.



Figure 19. The Hygienic Laboratory in its second home, occupying the 4th floor of the Butler Mansion, across the street from the South end of the U.S. Capitol in Washington, DC. The photograph is undated but was presumably taken in early 1899. At the time, Ezra Sprague was Kinyoun’s principal assistant; Hugh S. Cumming (1869–1948) was a new MHS officer training under Kinyoun and later became U.S. Public Health Service Surgeon General. John Macauley Eager (1864–1916) later became Assistant Surgeon General. Louis L. Williams (1859–1939) later became Chief Medical Officer on Ellis Island.

From the outset, he believed that the Hygienic Laboratory “should form the nucleus of one national in its character” (31). In support of quarantine practice, Kinyoun invented numerous industrial disinfecting machines and experimented with temperature and pressure variables in them (42). Returning to Berlin and Paris in 1894, he became the first American to study Kitasato’s/Yersin’s newly discovered plague bacillus, and was also fortunate to witness firsthand a spectacular therapeutic breakthrough that must have had great personal significance: von Behring and Kitasato’s diphtheria antitoxin (43–45). Kinyoun seems to have fully comprehended that he stood at the beginning of “a new epoch” (46). On the hospital wards, in the laboratory, and poring over clinical and epidemiologic information in both Paris and Berlin, he admitted that “I have tried hard to find fault, to pick flaws in the statistics, but have signally failed. The work must stand for itself,” and “[it] has opened up a whole new field in infectious diseases” (43, 44). Perhaps remembering his own lost Bettie, Kinyoun was even moved to perhaps the least guarded comment yet found in his scientific writings and speeches, describing the antitoxin’s lifesaving effect on dying children as “so astounding that at first one is almost compelled to ask one’s self ‘is this possible?’ ” (44, 45).



Back home, Kinyoun set about producing and distributing diphtheria antitoxin and other new biologicals (47), inviting specialists from around the nation to come to the Hygienic Laboratory to take a six-week course in preparation techniques under him, and making diphtheria antitoxin available to all of the MHS hospitals and to private physicians who were willing to send him detailed clinical information about their patients. He pleaded that physicians now had a moral responsibility to correctly diagnose and promptly treat their patients. As the lifesaving antitoxin began to be used, Kinyoun was also keenly interested in its impact on the epidemiology of diphtheria. He concluded that subclinical cases and those treated successfully were still transmitting diphtheria to others. In addition, he found that, although successful treatment was saving lives, it was actually increasing disease transmission, particularly to close contacts, because recovered children were quickly removed from isolation to resume contact with family members and schoolmates. He sent out and tested reagents, consulted with physicians and scientists, and became a committed advocate eager to speak at national and neighborhood

meetings on hygiene, public health, and good medical practice. To save as many children as possible, Kinyoun set up a public diphtheria laboratory at Georgetown Medical School, at great personal expense (38).

Kinyoun developed a smallpox immune serum and tested it in a human clinical trial, apparently the first such effort anywhere (48). He kept up an energetic multifaceted research program (Exhibit 1); worked on making a streptococcal vaccine; was among the earliest to develop an experimental pneumococcal vaccine and an immune serum (49); conducted important yellow fever work; studied bacterial carriage and transmission by well carriers; advocated for nosocomial (hospital- and medical-care-acquired) infection control (46); and in his spare time studied the brand new technique of Roentgenology (radiology) while getting a Ph.D. from Georgetown University in 1896. In the early 1890s, he mentored would-be Army researcher Walter Reed, who became a lifelong friend and confidant. When the U.S. House of Representatives requested it, he conducted an investigation of the ventilation of House chambers and suggested cost-effective changes, wryly implying that the offensive odor problem was partly due to members spitting tobacco juice onto the carpet (50). When Teddy Roosevelt and the Rough Riders came back from the Spanish-American war, Kinyoun put them under quarantine in Camp Wickoff, at Montauk Point, Long Island, to be treated for malaria, measles, and enteric fevers (51).

In Kinyoun's 1897 summary of the Hygienic Laboratory's first decade, he boldly proposed that instead of merely trying to study and control infectious diseases during epidemics, the federal government should create a laboratory-supported national and international research enterprise to "[look] into the nature, origin, and prevention of contagious epidemics, and other diseases affecting the people, and should also make investigations into other matters relating to public health" (52). This was a farsighted notion that went beyond the visions of most others in anticipating its mandate when it became the NIH some 33 years later. Meanwhile, the Hygienic Laboratory was expanding, and Kinyoun was developing increasingly comprehensive laboratory training programs for MHS officers (53).



Plague in San Francisco: 1900, the Year of the Rat

On 27 April 1899, Wyman suddenly transferred Kinyoun to run the enormous 32-building complex of the San Francisco quarantine station, the largest and most complete in the nation, if not the world (37). He replaced Kinyoun as Hygienic Laboratory director with his friend, Milton J. Rosenau (1869–1946). This sudden transfer was part of a general shake-up in MHS assignments involving a number of officers that was undertaken for unknown reasons. Despite appearances, Wyman’s transfer of Kinyoun might not have constituted a lack of confidence in him. The previous year, Wyman had fought the Treasury Department to extend Kinyoun’s directorship while strongly supporting (18) his promotion to Surgeon at the (supposedly) (36) record-breaking young age of 38. (This often-repeated claim of a record-setting youthful promotion is perhaps an exaggeration, as at least one MHS officer, William Henry Marsh [1851–1942], appears to have been promoted to Surgeon before age 35). In addition, plague—the most feared of all pandemic diseases—had been spreading globally for several years. Like most experts, Kinyoun and Wyman believed plague cases would eventually arrive at U.S. ports—especially San Francisco, which received heavy ship traffic from Asian cities with ongoing epidemics—and that only vigilant quarantine could keep the plague out. The horrific ongoing Asian epidemics, which were killing thousands, and remembrance of the 14th century’s Black Death, raised the specter of unimaginable devastation if plague ever reached American shores. Kinyoun had predicted plague’s eventual arrival in the United States as early as 1895, and had begun a plague research program in 1896, which he pursued even more energetically after receiving a strain obtained from China via the U.S. Navy in 1897 (18). Since 1897, Wyman had been writing and speaking about plague as an ultimate test for the MHS. Sending his top scientist to the front lines may have appeared necessary. Subsequent events, however, led Kinyoun to doubt Wyman’s motives, and the issue is clouded by other ambiguities in the puzzling relationship between Kinyoun and Wyman. The prevailing belief among historians is that a troubled relationship between the two men led Wyman to demote his top scientist, a belief consistent with Kinyoun’s later criticism

of Wyman and Wyman's reluctance to ever again mention him by name. But the full facts surrounding Kinyoun's reassignment and subsequent MHS career remain unknown.



The events that unfolded in San Francisco from 1899 to 1901—still being researched and written about more than a century later—represent one of the most infamous chapters in U.S. public health history (25, 27, 54–77) and the only part of Kinyoun's life that is somewhat known (albeit filtered through and distorted by the vicious politics, racism, and rampant yellow journalism that colored the era) (68). After a farewell dinner put on by Washington's medical elite (38, 78), Kinyoun arrived in San Francisco to learn that a "plague ship" was bound from Honolulu. Although Kinyoun found no plague on board, two similar scares followed within the next few weeks. The second of these (4 August 1899) ignited a long simmering feud between California and the federal government (37). Legislation in 1893 had given the MHS authority to work cooperatively with local quarantine officials, an ambiguous situation that most states were happy to accept as long as they received expensive/technically demanding federal quarantine services "for free." In California, however, quarantine had long become a "states' rights" issue, precipitating recurring dockside and courtroom confrontations. Wyman's order to "pay no attention to" (79) California quarantine officials put Kinyoun squarely at odds with combative California Governor Henry Tift Gage (1852–1924), who threatened the MHS and U.S. customs officials with armed force and lawsuits.

In the middle of these disputes, Kinyoun learned that plague had broken out in Honolulu, making it inevitable that "infected" ships would soon be arriving in San Francisco. In the meantime, he had to handle two smallpox epidemics in U.S. Army troops returned from Manila, suffer four recurrent episodes of appendicitis (11), and inspect hundreds of arriving Asian immigrants for excludable diseases and deformities, an American practice dating back at least to 1700. In December 1900, he would have to make a difficult decision about one such potential Japanese immigrant with a severe hand deformity. For some reason, Kinyoun overlooked this young man's otherwise excludable condition and authorized his immigration. The man, Hideyo Noguchi (1874–1928), became Kinyoun's friend and eventually an acclaimed microbiologist. In 1913, Noguchi elucidated the cause of syphilis and, like Walter Reed, would probably have won the Nobel Prize had he not died at an early age.

As the MHS mobilized to control the Honolulu epidemic, Kinyoun began quarantining all arriving vessels from the four current “plague ports”—Honolulu, Sydney, Hong Kong, and Kobe, Japan—simultaneously supporting the Board of Health in “cleaning up” San Francisco’s Chinatown through trash removal, rodenticidal fumigation of sewers and houses with sulfur dioxide—which, unfortunately, tarnished silver, leading to rumors of intentional poisoning, further diminishing the credibility of the MHS—and whitewashing/disinfection of homes by scrubbing with lye or bichloride of mercury. The focus on Chinatown reflected the belief—correct as it turned out—that if plague arrived, it would be imported by Chinese visitors and that most or all cases would be in Chinese visitors or local Chinese residents. Plague epidemiology was poorly understood in 1899, although an association with rats was known and flea transmission postulated. Because plague was a “disease of place,” featuring serial case clusters in one or a few buildings over prolonged time periods, public health efforts focused on identifying “infectious” foci and cleaning them up with disinfection and fumigation, or even burning them down with compensation to owners. On January 20, one such “controlled fire” got out of control and burned down Honolulu’s Chinatown (80), a tragedy that greatly alarmed San Francisco’s 25,000 Chinese residents.



A plague case in San Francisco on 6 March 1900, carefully confirmed by Kinyoun as the first ever on U.S. soil, was national news that caused near hysteria, drawing Kinyoun and the MHS into a fight they were well prepared to meet scientifically but ill prepared to meet politically (54, 81, 82). San Francisco’s mayor and Board of Health immediately placed Chinatown within a police cordon sanitaire, but backed off in the face of legal challenges by a Chinese cultural association allied with California businessmen and politicians. Seemingly everyone got into the fights that followed, with local and national medical and public health experts on one side, and California’s governor, allied politicians, Chinese and Western businessmen, and “muckraking” newspapers on the other. Gage repeatedly accused Kinyoun of malicious intent, declaring plague a ruse concocted by Kinyoun and the San Francisco Board of Health to blackmail the city for public health funds (83). In the California legislature, it was suggested that Kinyoun be hanged (84). As plague cases mounted, control efforts and house-to-house inspections and treatments were thwarted by residents,

especially Chinese, who understandably resented being discriminated against. An obscure film shot by C. Fred Ackerman of the American Mutoscope and Biograph Company shows health officials led by a uniformed health officer who was apparently also staging the scene (questionably Kinyoun or another MHS officer), inspecting Chinatown around noon on 15 September 1900, with the camera looking north from Washington Street up Washington Place to Jackson Street (Figure 20) (85). Kinyoun repeatedly advised Wyman against overly stringent public health measures, but nevertheless carried out all orders. Historians have credited Kinyoun with prescience in advising California to concentrate control efforts on killing rats rather than emphasizing quarantine and isolation. On May 15, with 11 indigenous Chinese cases already confirmed and many more hidden cases suspected, Kinyoun, with Board of Health support, declared an epidemic (57, 59).



Figure 20. Still image from a 60-second film taken in San Francisco's Chinatown, midday, September 15, 1900, by C. Fred Ackerman of the American Mutoscope and Biograph Company (85). The film, a paper print, is titled *Scene from Chinatown* (Library of Congress Paper Print Collection, H30730). The camera is looking North, from Washington Street up Washington Place to Jackson Street. The entire scene appears to have been staged for the camera, and is believed by the Library of Congress to be of a health inspection team. The man in the center of the image (above; a still frame from the film, at 22 seconds) has at this point walked back and forth across the street in front of the camera, obviously directing the film, and later heads toward the camera; he has not been conclusively identified but careful examination and measurements in individual frames indicate that he is bearded and wears a uniform with cap, insignia, buttons, and coat that is consistent with MHS uniforms of the day.

By this time, Wyman was calling the shots via daily urgent telegrams from Washington, working with Kinyoun to get prophylactic Haffkine serum (a preventive vaccine named after its developer, Waldemar Mordecai Wolff Haffkine [1860–1930]) from his Pasteur-based friend Émile Roux, and obtaining from President William McKinley authorization to implement 1893 interstate quarantine provisions, requiring health certificates for Chinese and Japanese persons within the epidemic zone to travel to other states unless they had been vaccinated. (Some states set up entry restrictions of their own.) Because most Chinatown residents were foreign subjects under the jurisdiction of the State Department, having long been legally prevented from acquiring citizenship, Governor Gage countered by lobbying Secretary of State John M. Hay (1838–1905) to influence U.S. Secretary of the Treasury Lyman J. Gage (1836–1927), Wyman and Kinyoun's boss, to end the quarantine. (Secretary Gage, unrelated to Governor Gage, was a man who Kinyoun knew intimately enough to refer to as “Lyman” in his correspondence [11].) Chinese residents got a restraining order in federal district court and brought suit against Kinyoun (86) before William W. Morrow (1843–1929)—a former U.S. congressman and trustee of Washington, DC's Carnegie Institution, a (later) incorporator of the American Red Cross, and in 1900, U.S. District Judge for the Northern District of California—for ostensibly overstepping federal orders. Bailhache, perhaps better positioned to understand that Kinyoun was being made a scapegoat, urged that he get outside counsel, which he did not (11).



Even so, Kinyoun, fully expecting to be found guilty, was exonerated when honest prosecuting attorneys “switched sides” and petitioned the judge to admit withheld evidence about the nature of his orders, which established his innocence (37). This reversal seems to have coincided with a chance meeting between Kinyoun and Judge Morrow on the ferry to Tiburon (11). By Kinyoun's account, his off-the-cuff presentation of the facts of the case during this encounter convinced Judge Morrow that he had been duped by the Governor and District Attorney (11), and that Kinyoun was being made a scapegoat by the intentional withholding of key evidence. After Kinyoun's acquittal, he seems to have maintained a friendship with Morrow, who even requested that Kinyoun help him rat-proof his house using the new rodenticidal “Danysz virus” just obtained from Roux (11). (“Danysz [or Danyz; or Pasteur] virus,” actually the bacterium

now known as *Salmonella enteritidis*, was among the first microorganisms ever employed for biological species control; it remained in use as a rodenticide in Europe at least into the 1950s.)

The national and California medical and public health establishments and most of the national press supported Kinyoun and the MHS; *The Journal of the American Medical Association* repeatedly editorialized on his behalf. Most of the San Francisco press was scathingly anti-Kinyoun and anti-MHS (Figure 21), calling Kinyoun “stupid and malignant” (87) and repeatedly claiming perpetration of a “plague fake,” even as plague case totals mounted. Among such important issues as state sovereignty, civil rights of minorities, and public health police powers, this was the first time that the authority of microbiology in public decision making had been put on national trial. Wyman now listened to the suggestion of his old friend Welch and called in an outside commission of national bacteriology experts to investigate: Simon Flexner (1863–1946; University of Pennsylvania), Lewellys F. Barker (1867–1943; University of Chicago, who would soon thereafter replace Sir William Osler [1849–1919] at Johns Hopkins), and Frederick G. Novy (1864–1957; University of Michigan) (88), with whom Kinyoun had already begun a scientific collaboration by sending him San Francisco plague isolates and tissue samples (Bentley Historical Library, University of Michigan, Frederick George Novy Collection, Box 1, correspondence; reference 18).

When the commission fully confirmed Kinyoun’s findings (88), Governor Gage and California politicians suppressed the report for several months. Secretary Gage countered with a threat to deprive California of revenue by closing Army headquarters there and diverting San Francisco-bound Philippine transports to Puget Sound if it did not act upon the MHS/Flexner Commission findings (89, 90). The standoff was finally resolved in the office of President McKinley, with Secretary Gage, Wyman, and Governor Gage’s representatives and with the mediation of California’s U.S. Sen. George Clement Perkins (1839–1923), who had long supported federal quarantine: California would let the MHS take over quarantine and plague control if the MHS removed Kinyoun from his post—via a request for reassignment once the scandal died down—and if California did not have to admit that Kinyoun and the MHS had been right about plague all along, thus remaining free to save face by opposing the Flexner Commission findings even as they allowed the MHS to act upon the Commission’s recommendations (81).



Figure 21. A cartoon from The San Francisco Call (19 June 1900). A sweat-drenched Kinyoun cowers before Judge Morrow, with a guinea pig, rat, and monkey nearby. These animals, which Kinyoun was using for plague isolation, had become cartoon shorthand for the alleged “plague fake.”

One of the Governor's representatives at that meeting, San Francisco Chronicle editor John P. Young, had allegedly announced before departing that when he returned from Washington, "you would see Dr. Kinyoun's scalp dangling at his belt"; immediately after Young's return, Kinyoun was reassigned to Detroit (37).

Kinyoun's private correspondence reveals a far different picture of his role in these events than most historians have described, claiming that even before he went to San Francisco he had advised Surgeon General Wyman that overly aggressive quarantine enforcement might be unconstitutional and would, in any case, be resisted (11). Kinyoun seems to have viewed Wyman as unnecessarily confrontational when his subordinates were in the line of fire but too quick to compromise at their expense when trouble erupted (11, 37). However, when his advice was overlooked or overruled, Kinyoun seems to have always followed orders to the letter, and to have been willing to accept the consequences, as he did in San Francisco. And he endured seemingly endless accusations, however improbable the claims. When a monkey broke into a hotel room in San Francisco and tore up a photograph of a man's girlfriend, the dailies accused Kinyoun of letting loose in the city his Angel Island research primates. He never "blew the whistle" on the many instances of questionable, unethical, or illegal practices he witnessed, including attempts to bribe him. Indeed, in comparing himself to the widow in Goethe's *Faust*, Kinyoun adopted Mephisto's role in drily humorous comments about her: "I wonder where she is going when she dies," he quipped; "I wont [sic] have her. She knows too much" (11).

Governor Gage finally (albeit temporarily) admitted a plague epidemic in San Francisco, but only with the new accusation that Kinyoun had started it by importing plague bacilli and planting them on cadavers (81, 91). Railing against the importation of what are now called "select agents" (81), Gage guided the passage of new laws against what would now be called bioterrorism (California Assembly bill numbers 558, 559, and 560) (81), which were among the first such laws enacted anywhere. In an irony that must have seemed bewildering, on the sad day of Kinyoun's arranged departure from San Francisco, his public notoriety brought one last tribulation: a charge of attempted murder. A deaf-mute fisherman claimed that Kinyoun, who had once vaccinated him, had directed riflemen to shoot him as he drifted offshore. An arrest warrant was issued; after hiding

from authorities by taking sanctuary at an Army installation, Kinyoun finally turned himself in. He was set free when Army testimony revealed that it had been soldiers chasing an escaped prisoner who had fired warning shots at the fisherman, a suspected getaway accomplice, and that Kinyoun had actually intervened to protect him (92). His accuser was unable to identify Kinyoun in any case. Free of courts, jails, and the San Francisco press, Kinyoun left for Detroit on 7 May 1901, after which Wyman allowed him, by prearrangement, a less than urgent trip to Asia to investigate ongoing plague epidemics, visit his old friend Kitasato, and pursue his growing interest in tropical diseases. On his way back, he stopped in the Philippines and codiscovered surra, a new equine disease associated with the previously identified *Trypanosoma evansi*.



It had been Kinyoun's desire to stay in the MHS, finish his work in San Francisco, and be vindicated, but this hope was not to be realized. Having been sacrificed for the good of the MHS and public health in general, Kinyoun felt that honor required him to resign. (The entire MHS officer corps supported Kinyoun in his trials; his close friend Henry Rose Carter pleaded against resignation: "Don't do it, old man. You are one of the men who helped make this service . . . Believe me . . . your life and good works will never be lost" [18]). Citing a "crusade" against him by California politicians, *The Journal of the American Medical Association* editorialized: "Dr. Kinyoun's offense was that he simply told the truth, and did not actively go to work to suppress it" (93). But on 1 May 1902, just as plague was making another comeback in San Francisco, Joe Kinyoun became a private citizen. It was, briefly, national news, and among the last times his name would be linked publicly to anything other than endless retellings of the San Francisco scandals. That the events that unfolded in San Francisco troubled him and left him defensive and perhaps embittered is clear from the two lengthy documents he wrote about it (11, 37). Perhaps he took some comfort in remembering what George M. Kober (1850–1931) had said about him at his honorary dinner in 1899: that no one "has contributed more to the reputation of the Marine Hospital Service and helped to place it on a higher scientific plane," adding that "men of this type are rare in this world" (38). He may also have taken some comfort in the outpouring of national support from the medical and public health communities and much of the general public,

and from most of the respected California medical community such as John M. Williamson, M.D., President of the San Francisco Board of Health, who wrote of him: “[he] was brutally maligned and scandalously misrepresented by persons desirous of making political capital” (81). A colleague noted that Kinyoun “was more proud of and devoted to” the Hygienic Laboratory than anything else (36). In his parting comments about the Hygienic Laboratory to Bailhache, Kinyoun reflected in 1901 that: “. . . it was through my efforts that the hygienic laboratory was established. My 15 years of work stands for this, and I believe that I can point to it with a little . . . pride . . . There is only one thing [no one] in the Marine Hospital Service can take from me, and that is my professional standing and character” (37). Yet perhaps reflecting on nearly two years worth of remarkable and often outrageous events in San Francisco, in the end he could muse: “It was really a tragic occurrence, but all tragedies are tempered with comedy” (37).



Life After the MHS

Ironically, some of Kinyoun's most important undertakings began to bear fruit just as he left the MHS. Two months later, on 1 July 1902, Congress expanded the MHS, renamed it the Public Health and Marine-Hospital Service (later the Public Health Service), and formalized and expanded the Hygienic Laboratory into three new divisions with numerous additional personnel (94). On the same day, Congress also passed legislation requiring the standardization of, and federal quality control over, biological products like serums and vaccines (47), an act that recognized a major sphere of activity within the Hygienic Laboratory, and which was later transferred to the yet-to-be-created Food and Drug Administration (FDA). Kinyoun had drafted the first of these acts (31), and had been an insistent force behind the second, ever since the subject had been raised with him by Koch, in November 1894. For almost a decade, these had been two of his greatest passions.



In November 1902, Governor Gage was voted out of office and replaced by a physician. Gage's farewell address in January 1903 renewed his personal attacks on Kinyoun for "ignorance and vicious conduct," once again denying that plague had ever existed (95). (Plague denialism in California persisted for several more years.) Seemingly defending his own actions in the plague epidemic as much as Kinyoun's, who he virtually never again mentioned by name, Wyman called a 19 January 1903 meeting of 19 state and territorial health officers—the first such meeting in U.S. history—at which he revealed a more volatile situation in San Francisco than had been generally known (96): MHS opponents had taken out a \$7,000 contract on Kinyoun's life (family records say it was \$50,000), forcing him to carry a loaded revolver and have an escape launch at the ready. The city of San Francisco had assigned 100 policemen to protect him; at one point the U.S. Army had been called in for the same purpose. During the worst of it, Kinyoun had traveled anonymously, checking into hotels under the name of "Kenar." The other states countered the actions of California by passing a resolution that viewed "with abhorrence the irretrievable disgrace" of California officials, which constituted a "grave national concern" (97, 98).

No American Black Death epidemic ever occurred, but by 1904, 121 plague cases—113 of them (93 percent) fatal—were diagnosed in San Francisco. Health officials believed that many more plague deaths had been concealed, a belief consistent with epidemiological findings: despite almost 100 documented Chinese plague deaths, when compared to pre-epidemic rates, the overall Chinese mortality declined dramatically during the epidemic. Kinyoun’s epidemic reconstructions, based at least in part on an earlier investigation conducted by MHS Surgeon James Morsell Gassaway (1848–1939), later persuaded him that plague had probably been imported into San Francisco as early as 1898 (11). It is now known that California’s flea species (*Ceratophyllus fasciatus*) has reduced vector competence (the capacity to transmit plague) compared to the classic plague vector *Xenopsylla cheopis*, and was probably insufficient to cause a massive plague epidemic in the United States. Epidemic plague nevertheless returned after the 1906 San Francisco earthquake to claim even more lives, this time predominantly in white citizens. Moreover, plague escaped into ground squirrels (*Otospermophilus* [formerly *Citellus*] *beecheyi* and other squirrels and prairie dogs) to establish a new American “reservoir” that remains, 112 years later, a continuing public health threat in many Western States.

As Assistant Surgeon General, Geddings became Wyman’s new right-hand man; after 1902, both officers were supportive of the Hygienic Laboratory during a renewed period of growth and development under the productive leadership (1902–1909) of Rosenau. Wyman died of complications of diabetes in 1911. Kinyoun’s uncle, Preston Bailhache, urged Kinyoun to write a book about the San Francisco epidemic. Despite privately penning at least two lengthy and detail-rich letters/documents about it (11, 37), with the promise to write more in the future, Kinyoun apparently went only so far as to suggest that if he did write such a book, he would title it after Victor Hugo’s 1862 classic novel *Les Misérables* (“the unfortunate ones”), calling it *Les misérables en quarentaine* (11).



After leaving the MHS, Kinyoun went to work for one of the two major pharmaceutical firms then in existence, the H.K. Mulford Laboratories in Glenolden, Pennsylvania (now Merck, Sharp and Dohme), with which he had for several years worked closely to produce and maintain the

quality of various biological products (18). Ironically, he returned briefly in 1906 in the role of Hygienic Laboratory “adviser,” as a member of the Society of American Bacteriologists committee helping the MHS standardize tetanus antitoxin (25). After four years at Mulford, Kinyoun wanted a more stable and stimulating life for Lizzie and their children. To that end, he returned to the District of Columbia to direct its Health Department Bacteriology Laboratory. During the following decade, he worked with MHS and other colleagues on a variety of scientific problems, especially water quality, bacillary dysentery, and hookworm disease in poor Southern children. He developed a safer, more reliable, and widely used smallpox vaccination technique (the “Kinyoun method,” which featured rapid rolling of the needle parallel to the skin surface), with Public Health Service endorsement, before development of the bifurcated needle in the 1960s (99); perfected a stain for *Mycobacterium tuberculosis* and other organisms (the Kinyoun stain [100]); and even predicted the future importance of transplanting organs from deceased donors. In later years, he told the story about how on one occasion, when his dairyman failed to show up for several days, Kinyoun—who had been pasteurizing his family’s milk at home since 1893, long before industrial pasteurization was introduced—discovered a milkborne typhoid fever outbreak by investigating the dairyman and five families on his route who had become ill. His civic commitment included a stint on the public order committee of the District of Columbia police force. When a polio epidemic threatened, he quickly went to New York City, then in the grips of a major epidemic, to study prevention approaches that might be applied at home in the District. He repeatedly stressed the importance of zoonotic diseases (animal diseases that infect humans) (46) and argued for better notification of infectious diseases as a means of better disease control. He became increasingly involved in such progressive community public health issues as basic sanitation and hygiene, tuberculosis control, water safety, meat safety, bread quality, and milk sanitation, taking on a community role similar to what might now be called a “consumer advocate.”

As an elder statesman, he served energetically in many national professional societies, including as Vice President of The American Society of Tropical Medicine [and Hygiene] during its first full year (1904) and as First Vice President of the American Public Health Association (APHA) in 1906. He had also been a prominent leader in the 1894 Convention of [American] Bacteriologists (101), which brought the profession together for

the first time. Five years later, the Society of American Bacteriologists (now the American Society for Microbiology) was formed; Kinyoun became its national president in 1909, delivering his presidential address on the future of immunology, in which he discussed the new/evolving idea of two immune compartments, natural and acquired immunity (1). At one point in 1907, he served simultaneously as chairman, vice chairman, or member on four different APHA committees. He was active in many other professional societies, including the American Association for the Advancement of Science, and the Association of American Physicians.



In 1908, Kinyoun was elected to the Cosmos Club, whose members included not only prominent medical men like John Shaw Billings and Bellevue-trained colleague William Crawford Gorgas (1854–1920), but also prominent men from other fields, such as inventor Alexander Graham Bell and future U.S. Presidents William Taft (1857–1930) and Woodrow Wilson (1856–1924). He occasionally attended dinner events with sitting U.S. Presidents and Vice Presidents. Lizzie Kinyoun became active in public service groups, such as the Women’s Committee and the Committee of Women of the National Tuberculosis Congress, and her husband was a frequent speaker at such civic events. In 1916, Kinyoun took a three-month leave of absence to become Director of Winston-Salem’s Health Department, returning to Washington after thoroughly reorganizing the department. He and Lizzie were active in Washington’s Temple Baptist Church. Like his father and other male relatives, Kinyoun was a Mason, attending Washington, DC’s Benjamin Brown French Lodge No. 15. His private life seems to have been far from dull. At home, he wrote fanciful stories and verse. For a time he raised two chow dogs—then an exotic breed in America—received from an Asian ship captain, ostensibly to prevent them from ending up on the menu at a Chinese banquet (102). A New York Times story in 1910 attributes to Kinyoun an elaborate theory that ear shape determines musical ability (103). Several newspapers described a more bizarre event. All of her life Lizzie Kinyoun had longed to see her own mother, who had died shortly after childbirth. Nearly 30 years later, she traveled to Centre View (it is unclear whether her husband accompanied her) and had her mother’s “hermetically sealed” metallic casket dug up and opened. According to The [Baltimore] Sun, Lizzie gazed upon the face of a beautiful young woman who appeared to be still alive (104).

Speaking candidly about the Hygienic Laboratory in 1906, Kinyoun articulated a vision for the future of national public health that echoed some of the notions of men who came to prominence in the 1870s, such as Woodworth and Hamilton. Kinyoun had long spoken in favor of dramatic expansion of the MHS into a powerful national organization taking on all diseases and trying to eradicate those that could be eradicated. In 1906, Kinyoun again and even more forcefully argued for a “national sanitary organization” with a strong research-oriented laboratory core that would not only conduct its own research but also assist the states in research, outbreak investigation, apparently also the control and standardization of biological products, and the prevention and eradication of diseases; in essence, a powerful national organization that would combine the separate functions of what are now the FDA, the NIH, and the Centers for Disease Control and Prevention (31). In a similar proposal in 1910 for a national health department to be directed by a cabinet level secretary (S. 6049), Oklahoma Sen. Robert L. Owen (1856–1947) (1, 105), who was of Cherokee descent, remembered the San Francisco plague events in a speech on the U.S. Senate floor. In defending Kinyoun and the other public health officials who had been on the front lines, Owen stressed the need for a national health entity.



Perspectives

Kinyoun has long seemed an indistinct and mysterious character in American biomedical science. Was he a seminal figure or merely a man in the right place at the right time whose role might just as well have been filled by another? Was he a visionary who saw and brought about the future of biomedical science, or an ordinary man of average skills? Would the NIH exist today without him, and if so, in what form? What role did he play in the rapid expansion of American microbiology into a century of dominance in the field? These are questions that cannot now, and perhaps may never, be answered. Kinyoun lived at a time when microbiology, epidemiology, and public health practice came together as a powerful new tool yet to be disentangled into separate disciplines. He seems to have been comfortable with new technology and new ideas, and was able to anticipate their potential importance long before it became apparent to most others. Kinyoun seems to have seen medical research as an exciting new way to be a better physician and citizen. In pursuing medical and public health problems, the record suggests that every step Kinyoun took, even in the most rigorous of experimental research, was directed toward the immediate goal of saving lives and alleviating human suffering and not for mere interest's sake. Whatever he did, no matter how innovative or technical, was never very far from the bedside or from community welfare. His definition of an ideal health officer seems an apt description of himself: "A true physician in every sense of the word, a man of broad views, of progressive spirit... and a large supply of good common sense" (46). In addition to his work in bacterial and mechanical/engineering areas, Kinyoun had at least one unique ability: to draw insightful public health conclusions from complex and technical scientific data.

Kinyoun was born into a romantic antebellum world of frontiersmen, Native Americans, adventurers, war heroes, and old world Southern gentility; he lived to see a modern era of electricity, telephones, movies, radios, automobiles, airplanes, and noisy, hectic urban life. An old-fashioned Southern gentleman with old-fashioned values (even in private letters to worldly wise colleagues, he wrote "d_n" and "h_l" for "damn" and "hell"), Kinyoun ended up a "progressive," living and achieving success in a modern world that had little interest in old-fashioned ways.

It was a world of tremendous progress and large-scale upward mobility that could erase one's origins. At home with memories of the old South and fanciful Uncle Remus-like tales of antebellum plantation life (18), Kinyoun seems to have easily become a polyglot and internationalist, moving about comfortably in the capitals of Europe and Asia, readily adapting to foreign customs and ways of looking at the world. If there are paradoxes or ironies in Kinyoun's life story, it is not clear that he appreciated them.

The medical world of his childhood had been one of mysterious miasmas and vague telluric (terrestrial) influences acting upon unpredictable diseases of completely unknown causes, of amputations for bacterial infections, and of bleeding and purging for even mild diseases. He lived to see not only full scientific acceptance of the "germ theory," a rather obscure notion when he was a child, but also complete public acceptance of it as well. More importantly, he saw the tremendous advances in diagnosis, treatment, and public health that arose from acceptance of the germ theory: not just passive immunotherapies, vaccines, antimicrobials, aseptic surgery, or the beginnings of vaccination against childhood diseases, but also mothers sterilizing rubber nipples in pots of safe boiling municipal water, to place upon bottles of pasteurized milk.



It is natural to want to know what sort of man Kinyoun was. But history is not a tool that can easily probe the essential characters of people long dead. Provisionally, and without attempting to look too closely to find the inner man, Kinyoun appears very much a man of his times: progressive, intelligent, and optimistic, who found himself at the cusp of a dramatic new "epoch," as he called it (46); and, as is often the case with young men of energy and optimism, especially at a time of rapid scientific/technical advances, was able to intuitively recognize and understand it, and to find a comfortable place at its leading edge. Kinyoun seems to have been most at home in the certainty of experimental science and established conclusions, attracted to order and regimentation, a "by the books" conformist, an innovator but an even better adapter.

At the same time, he was an original and broadly oriented "big thinker" and an altruist to whom science was an instrument of human good.

Kinyoun's private correspondence suggests a thorough enjoyment of both his career and personal life, including an unusually intimate and caring family life with strong ties to many friends and family members around the country. He appears to have been scholarly and well-read, thoughtful, reflective, rational, careful, old-fashioned, sensitive, sentimental, loyal, patriotic, full of wit and wry, often facetious and even sarcastic humor, and a pacifist and internationalist but an opponent of colonial expansion. He was also frequently self-doubting, stubborn, fatalistic, moralistic, prone to wounded pride, occasionally prickly and defensive when he felt unfairly treated, and oriented toward hierarchy and following orders. Kinyoun's perhaps self-justifying view of criticism that he was single-minded and inflexible was that he was instead outspoken and honest, unafraid of going against popular opinion, and incorruptible—traits that he referred to as "Kinyounism," turning around a pejorative term used by the San Francisco newspapers working against him in 1900. Scientifically circumspect and conservative, he was also personally imaginative, creative, and sometimes effusive in a perhaps characteristically Southern way.



By all accounts a humble man, Kinyoun remained strongly service-oriented and never outwardly sought leadership positions, promotions, or influence. When offered a highly paid position at Chicago's Rush Medical College, he turned it down on the grounds that, having received most of his training and experience in government service, he had an obligation to use his abilities to serve his country (38). His few leadership positions were mostly officerships in professional societies and were generally associated with hard work and service rather than personal fame or control over others. He seems to have been most content behind the scenes, a consummate team player, repeatedly giving ideas, data, and credit to others, often not even publishing his own work but always sharing it widely. Though soft-spoken, gentlemanly, and nonconfrontational, Kinyoun does not appear to have been shy. In national and international meetings, he spoke often, authoritatively, and with the force of logic—avoiding conclusions beyond what the data established, rarely speculating, and always being fair to multiple sides of an issue. When he spoke, his opinions appear rarely to have been challenged by others. He clearly held his own in discussions and friendly debates with virtually all the American and European leaders in microbiology, immunology, and infectious

diseases of his era. His opinions and assistance were widely sought by many leading scientists and appear to have been always given generously.

Colleagues seemed to respect him and defer to his experience and wisdom. Many continued to remember and write about him in admiring terms long after he left the national spotlight (1, 36, 106). A North Carolina friend called him “a splendid illustration of a high-grade, cultured Carolina gentleman,” having “a wonderfully well-stored mind of many things calculated to both edify and enlighten” (107). He also exhibited a talent for identifying and mentoring promising men, not only Reed, Rosenau, Geddings, and William Franklin Elgin (1861–1938), but others like John F. Anderson (1873–1958), who became director of the Hygienic Laboratory after Rosenau, and two future Surgeons General: Hugh S. Cumming (1869–1948; serving as Surgeon General from 1920 to 1936), who trained under Kinyoun in the 1890s, and Thomas Parran, Jr. (1892–1968; serving as Surgeon General from 1936 to 1948) (25), a medical student Kinyoun mentored near the end of his life, and in whom he instilled the desire to pursue a career in the Public Health Service (38).



The End of an Era

In 1917, when the United States entered the European war, Kinyoun had been largely forgotten by the public, but the “Kinyoun portable bed disinfectors” (for bedding, clothing, dressings, and for killing lice) he had coinvented were still being used for sterilization in newly built Army hospitals. Always quietly patriotic—and in uniform throughout most of his adult life—Kinyoun now sought to join the Army. Old friends rallied around him. Somehow, at age 57, he was given an active duty commission as an expert epidemiologist assigned to the beloved region of his birth, the cantonments in North and South Carolina. Perhaps an old Bellevue colleague, now Army Surgeon General Gorgas, had pulled some strings. Kinyoun was working in the places he loved best, directly under Gorgas and one of his senior staff officers, Colonel Victor C. Vaughan (1851–1929), another bacteriologist friend stationed in North Carolina, to investigate statewide typhoid epidemics. Four months after deployment, Kinyoun found a lump in his neck; biopsy revealed an inoperable lymphosarcoma, a fatal diagnosis. Vaughan helped him circumvent Army regulations to get the best civilian care available; Welch, also now on active duty as a Brigadier General, may have arranged for his treatment at Johns Hopkins Hospital.



Kinyoun still carried the old rabbit’s foot (25), but it no longer brought him luck. On 15 August 1918, he drafted both a will and a letter of instruction to Lizzie that upon his death he be buried with their daughter Bettie, who had died of diphtheria—by now both a vaccine-preventable and a serum-curable disease—30 years earlier. As his health declined, Kinyoun, apparently under the protection of Army medical friends, was reassigned on 6 December 1918 as a pathologist to Washington’s Army Medical Museum, where his late friend Walter Reed had been curator, and finally, one day before his death, to Surgeon General Gorgas’ office. Kinyoun died at home of “myocardial insufficiency” (primary death certificate diagnosis), with Lizzie at his side, and the Army physician caring for him, Captain George C. Smith, in attendance, at 4:45 p.m. on Valentine’s Day, 14 February 1919. He was by that time forgotten by all but a few old timers. Lizzie died in 1948, and the couple was reunited in a single Centerview gravesite with their daughter Bettie.

Along with others of the 116,707 fallen American soldiers of the Great War, Kinyoun's name was placed within the cornerstone of the World War I Memorial on the National Mall in Washington, DC. A marble statue to World War I's fallen District of Columbia employees, with Kinyoun's name engraved upon it, sits largely unnoticed in a stairwell of the District's Municipal Building on Pennsylvania Avenue, not far from the White House. Kinyoun's second son, Conrad Houx Kinyoun (1896–1948), became a medical scientist who worked for a time at the NIH, married into the North Carolina Craighill family of noted Rockefeller scientist Rebecca Lancefield (1895–1981), and became Director of Savannah, Georgia's, Department of Health Laboratories. The Liberty Ship Joseph J. Kinyoun (a cargo ship) was commissioned and saw service in World War II, but later was destroyed. In 1935, Wilfred H. Kellogg, one of the nation's leading plague experts, recalled: "I remember of Dr. Kinyoun... there was no better bacteriologist probably in the country" (106). Kinyoun's name, Kellogg claimed, "should be indelible in the annals of public health" (55). Lizzie and her oldest surviving daughter, Alice Eccles Kinyoun [Houts] (1889–1974; Figure 22), who had always believed that one day the stigma of San Francisco would fade and that Kinyoun would at last be fully vindicated, put 75 boxes of his papers, documents, photographs, and memorabilia into storage, where those surviving have remained untouched for almost a century (18).



Figure 22. Kinyoun's eldest surviving daughter, Alice Eccles Kinyoun [Houts] (right), and her grandson Joseph Kinyoun Houts, Jr. (left), 1971.



Figure 23. Painting of Joseph James Kinyoun by artist Walmsley Lenhard (1891–1966). The painting hangs with others in a series depicting each of the NIH Directors, painted by Lenhard and later artists, in Building 1 on the NIH campus (the James Shannon Building) in Bethesda, Maryland. By the time the painting was executed, Kinyoun had been dead for decades. Other than the Zeiss microscope, which Kinyoun purchased for the Hygienic Laboratory, it is not known what information Lenhard used to compose the picture. The walls and shelves do not correspond to those of the Hygienic Laboratory in either its Staten Island or District of Columbia locations. Although Kinyoun left the Hygienic Laboratory when he was 38 years old (in 1899), his face in the painting appears to have been reproduced from a photograph taken around March 1918 (Figure 1), when Kinyoun was 57 years old, thus making him appear much older than he was when he directed the laboratory.

The Hygienic Laboratory was renamed the National Institute (later "Institutes") of Health in 1930 (2). Today it is the world's premier biomedical research organization, containing not only the core Institute that once was the Hygienic Laboratory—now called the National Institute of Allergy and Infectious Diseases (NIAID)—but 26 other Institutes and Centers that work globally with the nation's and the world's best scientists to prevent and treat virtually all human diseases. An oil portrait of Kinyoun hangs in the main administration building of NIH, Building 1, the James Shannon Building (Figure 23). In 1962, NIH celebrated its 75-year anniversary with a symposium featuring historical talks on the history of NIH, remarks about the founding of the Hygienic Laboratory, and with a newly drawn artist's rendering of Kinyoun on the brochure's cover. A Kinyoun Lecture Series, begun by NIAID in 1979, is among the most prestigious of NIH's named lectures. Were he alive today, Joe Kinyoun would surely be astonished and gratified to see what his efforts produced. Surely he would be far less interested in NIH's buildings, laboratories, equipment, scientific techniques than in what NIH is doing, and will do in the future, to save human lives and reduce the suffering caused by diseases.



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