

## B. FRANKLIN ROYER: A HALF CENTURY IN PUBLIC HEALTH

*Jim Higgins*

**Abstract:** Pennsylvania is often regarded in the historiography of public health, medicine, urban, and industrial history as little more than a disaster; her chief cities, Philadelphia and Pittsburgh, highlighted the health disparity between rich and poor, their tenements among the most degraded in the nation, their water poisonous, and their skies leaden. The plight of the state's city dwellers were exceeded in misery and mortality rates only by the wretched conditions of the coal patches, small steel towns, and timber camps that dotted the Commonwealth. By the turn of the twentieth century enough political will was mustered to overcome objections to a state department of health. Benjamin Franklin Royer emerged from the public health apparatus of Philadelphia to assume a critical role in the department, eventually rising to its head and guiding the state through the influenza pandemic of 1918. In the early 1920s, after a titanic explosion leveled most of Halifax, Nova Scotia, Royer took the lessons he learned in the state and rebuilt Halifax, starting the first public health nursing program in Canada. Between 1926 and 1932 he was medical director of the National Society for the Prevention of Blindness where he led a campaign against bacteria-induced blindness in newborns and adolescents before returning to Pennsylvania to work on antiblindness and tuberculosis control efforts.

*T*he historiography of public health in the United States devotes much space to the positive role that the health departments of New York City, Providence, Rhode Island, and Milwaukee,

Wisconsin, among others, played in the development of public health during the Progressive Era, with works such as John Duffy's *A History of Public Health in New York City: 1866–1966* and Judith Walzer Leavitt's *The Healthiest City: Milwaukee and the Politics of Health Reform*, rightly taking their place as leaders in the historiography.<sup>1</sup> Likewise, historians have lionized leaders of certain urban health departments, for instance, Herman Biggs and Charles V. Chapin—with the single best volume of this genre James H. Cassedy's *Charles V. Chapin and the Public Health Movement*—for their focus on the health of the urban poor and influence on public health officials and practices across the country.<sup>2</sup> Other public health leaders not attached to a particular board of health, such as Rupert Blue, William Welch, and Joseph Goldberger, were celebrated for a mixture of their individual scientific work—identification and control of plague in San Francisco in the case of Blue and the epidemiologic investigation of pellagra in the South by Goldberger—along with their prominence in national public health organizations and, in the case of Welch, the founding of the Johns Hopkins School of Medicine and Hospital.

Pennsylvania, the second most-populous and most-industrial state, and home to two of the largest cities in the nation, acted as little more than a foil in the general narrative of triumphant public health leadership. To be sure, the condition of the Commonwealth presented a grim picture: Philadelphia and Pittsburgh were public health disasters through any lens, with works such as Sam Alewitz's "*Filthy Dirty:*" *A Social History of Unsanitary Philadelphia in the Late Nineteenth Century*, John F. Bauman and Edward K. Muller's *Before Renaissance: Planning in Pittsburgh, 1889–1943*, Jacqueline Karnell Corn's *Environment and Health in Nineteenth-Century America: Two Case Studies*, S. J. Kleinberg's *The Shadow of the Mills: Working Class Families in Pittsburgh, 1870–1907*, and Joel A. Tarr's *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective and Devastation and Renewal: An Environmental History of Pittsburgh and Its Region* highlighting the political corruption and corporate influence that produced mortality rates unparalleled in like-sized cities in the industrialized Western world.<sup>3</sup>

The historiography of the history of medicine in Pennsylvania follows the trend of the more general histories and is most heavily concentrated upon epidemics in urban areas. Not surprisingly, the devastating yellow fever outbreak in Philadelphia in 1793 figures prominently. J. H. Powell's *Bring Out Your Dead* is dated but remains the standard history of the epidemic, while an essay by Thomas Apel, "The Rise and Fall of Yellow Fever in Philadelphia, 1793–1805," provides a definitive account of the economic

and social relations between the city and the Caribbean as well as the public health responses the city implemented to lower incidences of the disease.<sup>4</sup> The quality of Philadelphia's water and the political fights generated by the effort to disinfect it were examined in Michael P. McCarthy's *Typhoid and the Politics of Public Health in Nineteenth-Century Philadelphia*.<sup>5</sup> More recently, William Pencak illustrated the role of dispensaries in Philadelphia and the legal fights they provoked in his essay "Free Healthcare for the Poor: The Philadelphia Dispensary."<sup>6</sup> On a broader front, Barbara Bates's excellent work, *Bargaining for Life: A Social History of Tuberculosis, 1876–1938*, explored the relationship between a pervasive and lethal disease, its chronic sufferers, and the role of medical intervention before the antibiotic era.<sup>7</sup> Beyond the cities, the coal mines and the communities they supported continue to garner historians' attention. Karol K. Weaver explored gender, ethnic identity, and folkways in "She Knew All the Old Remedies": Medical Caregiving and Neighborhood Women of the Anthracite Coal Region of Pennsylvania" and in a more recent monograph, *Medical Caregiving and Identity in Pennsylvania's Anthracite Region, 1880–2000*.<sup>8</sup> As well, a number of studies detailed the mine disasters, especially in the state's anthracite region. Two noted works in this genre, especially as they trace the labor, political, and economic results of coal disasters, are *The Knox Mine Disasters: The Final Years of the Northern Anthracite Industry and the Effort to Rebuild a Regional Economy* by Robert P. Wolensky, Kenneth C. Wolensky, and Nicole H. Wolensky and *Tragedy at Avondale: The Causes, Consequences, and Legacy of the Pennsylvania Anthracite Industry's Most Deadly Mining Disaster, September 6, 1869* by Robert P. Wolensky and Joseph M. Keating.<sup>9</sup>

What remains for historians to explore is the state's role in Progressive Era public health and medical advances and the careers of public health leaders who implemented those changes. Pennsylvania's health department was only created in 1905, long after most states had such organizations, and remains overlooked by historians. Barbara Gutman Rosenkrantz, for instance, explored the development of the Massachusetts Board of Health in her seminal work, *Public Health and the State: Changing Views in Massachusetts, 1842–1936*.<sup>10</sup> Though the Massachusetts board faced resistance in many areas, it benefited from its inauguration in the prebacteriologic era and the decades it spent developing concomitantly with the new scientific and public health advances of the late nineteenth and early twentieth centuries. By contrast, the Pennsylvania Department of Health was charged with the unenviable task of imposing novel, science-based standards upon a citizenry

hitherto free from most public health oversight at any level of government. Despite sometimes-staunch resistance, the history of the Pennsylvania Department of Health, at least its first dozen years, comprised a compelling trajectory; the department created a bureau of vital statistics whose methods the federal Census Bureau adopted as their own, broke new ground in statewide treatment of tuberculosis, improved the quality of many of the state's small streams through effective pollution control, enforced isolation and quarantine of households and communities, and saved tens of thousands of lives. In addition, the department initiated the state's first public health nursing program, originally dedicated to staffing state-run tuberculosis hospitals and dispensaries, but later expanded to offer aid during epidemics and natural disasters, for instance, the Austin Dam collapse in 1911.

One of the most important figures in Pennsylvania's medical history was Benjamin Franklin Royer. Royer earned his medical degree in the late nineteenth century and spent the first two decades of the twentieth century in command of the state's largest publicly supported contagious disease hospital, acted as the Department of Health's chief enforcer, and ultimately headed the department during the last years of World War I and the influenza epidemic. He spent the dozen years after the war outside the state, laboring against public health problems in Canada and the American West Coast, and as America's premiere antiblindness crusader. His return to Pennsylvania in the early 1930s began another twenty-year association between the Commonwealth and Royer. Pennsylvania provided an ideal environment for sharpening his public health skills; the state's excellent academic institutions and hospitals, and the minds that staffed them, were juxtaposed to appalling health conditions across the state and a political class and general public that was often hostile to public health improvements. Perhaps no state, as understood through the prism of the intense resistance of politicians and citizens to health reforms, better exemplified the revolutionary nature of the struggle between old beliefs and new science in the fight against disease. From these struggles emerged a medical triumphalist inured to political and social obstacles and versed in seemingly every aspect of public health work.

For a man with a prominent role in public health, Royer is surprisingly difficult to know beyond his public writings, lectures, and media coverage. Such sources do, however, allow scholars to construct a composite of Royer's views on subjects beyond strictly public health and medicine. For instance, his statements and actions—and in the case of African Canadians his inaction—offer insights into his views concerning the role of women in

both healthcare and society, as well as stereotypes he held concerning class, race, and ethnicity. What emerged is a physician devoted to the notion that science-based medicine held the power to a future of continuously declining disease, a public official convinced of the efficacy of public health in the prevention of disease and increased standard of living, and a crusader unapologetic in neither his fights against entrenched interests nor his efforts to promote the responsibility of the individual in preserving one's own health through "clean" living. He disdained any considerations—political, business, or simple ignorance—that threatened the public health. Royer was, according to such an essay, a Republican progressive and committed technocrat who saw political reform allied with technology as the harbingers of a better world.

Compared to his public life, however, Royer's private life remains shrouded. He kept no journal of his personal or public affairs and appeared to have had no associates not connected to his profession. Royer did not marry until age fifty-five, and when his wife died in 1932 she left no personal papers. His second wife, whom he married in 1936, passed away a few years after Royer and likewise left no diaries or other personal papers. Royer had no children and spent most of his life away from his family so that even anecdotal accounts of his life away from public duties remain impossible to find. When he died at ninety, his obituary resembled a resume, with only his wife and "a number of nieces and nephews" listed as survivors.<sup>11</sup> His only archived paper collection amounts to fewer than twenty pages of lecture notes, clippings, and sundry public health notes kept by Dalhousie University in Halifax, Nova Scotia, none of which contain personal reflections. Again, however, the outlines of a personality may be discerned. Royer presented a tidy image in the few photographs that remain, his neat hair parted on the left, and unlike many of his peers, he kept himself clean shaven. In none of the portraits does he evince even a trace of a smile, and in this regard his visage matches his record as a man who saw the world, at least the world of public health, in near-absolute terms of right and wrong; in such matters he was often the final arbiter and seldom wasted time on politicking or compromise, a tendency that produced mixed results.

Royer began life on a farm in south-central Pennsylvania in December 1870. The rolling farmland of post-Civil War Franklin County afforded a comfortable life for Royer's family, one of the oldest families in the county, but offered scant opportunity for training an astute mind with a scientific bent. Young Royer received his education in one-room schoolhouses, in

lessons his parents offered at home in German, and in his late teen years at Cumberland Valley Normal School, later renamed Shippensburg University.<sup>12</sup> In the early 1890s Royer taught briefly at a rural school near the family farm and then ventured to Illinois where he completed a two-year degree for teachers and taught in another rural school until 1893. He attempted to secure a science degree from Dixon College in Illinois but withdrew and returned to Pennsylvania in August 1893 upon the death of his father. He next entered Mercersburg Academy, where the school entrusted him with a position teaching younger students and from which he graduated in 1895 as class orator.

The next step in Royer's education shaped the rest of his life and exerted a profound influence on the quality of life in Pennsylvania for decades; Jefferson Medical College accepted his application and he entered medical school in August 1895.<sup>13</sup> The 1890s were an exciting period of American medical education as breakthroughs made by European scientists in the 1880s confirmed the role of microbes as the cause of infectious disease and the principles of the germ theory revolutionized medical education. Royer's decision to enter medical school in Philadelphia placed him in proximity to several large hospitals as well as some of the brightest medical minds in the nation.<sup>14</sup> One of those minds belonged to Wilmer Krusen, an expert obstetrician/gynecologist who also evinced a strong interest in public health and later served as head of the Philadelphia Department of Health and Charities. With Krusen as his preceptor, Royer graduated from Jefferson in 1899 as a Gold Medal student in obstetrics and honorable mention in gynecology. By the autumn of 1900, after a short stint in Canada attending a private patient, Royer secured a position at Jefferson Medical College as lecturer in anatomy and obstetrics and was quickly promoted to chief resident physician for Jefferson Hospital.<sup>15</sup>

The new physician's first important foray into public health occurred in September 1903 when a senior professor at Jefferson Medical College, Dr. Hobart Hare, suggested to the Department of Health that Royer assume the directorship of the Philadelphia Municipal Hospital for Contagious Diseases.<sup>16</sup> Built in 1865, the hospital was one of the largest of its kind in the country and its patients tended toward the lowest rungs of the socioeconomic ladder. Municipal Hospital, as it was often called, ameliorated the devastation of a number of epidemics in the late 1800s, including large outbreaks of diphtheria, scarlet fever, and typhus. Though adequate by the standard of care during the first years of operation, by the 1890s the hospital was in

disrepair, with clapboard sheds designated for the isolation and care of those suffering from lethal infectious disease. Beyond the walls of the hospital, the city, on whose periphery the facility once stood, continued to spread toward its grounds. Beginning in 1889, public health leaders pled with the city for a new hospital adequate to the needs of the growing metropolis and in keeping with the advances in standard of care initiated by the bacterial revolution, but by 1893 the city council decided to appropriate funds to increase the number of buildings of the original hospital rather than construct a new facility.<sup>17</sup> The physician-in-chief preceding Royer, noted local public health figure and physician William M. Welch, proved an able administrator and caring physician, but he handicapped himself and the hospital by remaining "violently opposed to a laboratory-oriented" style of medicine.<sup>18</sup> Put another way, he trusted the experienced eye of physicians and demonstrable symptoms more than the laboratory assays of bacteriologists; rather than embrace new methods, he chained the hospital and its patients to prebacteriologic medicine. Welch's attitude extended to even diphtheria antitoxin, whose results he believed were so overstated that in 1898 he declared to attendees at an American Medical Association conference that diphtheria never constituted the great killer in Philadelphia as it had in other cities; nor was antitoxin the miracle cure.<sup>19</sup>

Royer's appointment marked a departure from past practices. Before he took up his post, Royer traveled to public contagious disease hospitals in New York, Boston, and Montreal, where he studied quarantine and treatment methods and gained a deeper understanding of public medicine, distinguished from public health by the former's focus on the individual patient and the treating of disease, as opposed to public health's concentration on populations and disease prevention. He continued to study other contagious disease hospitals in Great Britain and Canada throughout his tenure at Municipal Hospital to improve his own efforts. When he began his directorship, he found the hospital in the midst of a maelstrom as the last of the large, lethal epidemics of smallpox carried off dozens in the city and deposited scores of the sick and dying within the hospital's walls, an epidemic the city finally broke through mass vaccination, but not before more than 800 deaths occurred in the hospital over the course of three years.<sup>20</sup> In 1904 Royer established the first bacterial laboratory on the hospital's grounds, finally reversing years of reticence on the part of the former director and obviating the need to run specimens to the seventh floor of City Hall, which housed the only other city-operated laboratory.<sup>21</sup> With the laboratory operating, Royer instituted a

rigorous modern approach to diagnosis and treatment with the laboratory a centerpiece in both treatment and research.

Municipal Hospital offered Royer the opportunity to initiate studies on infectious disease, especially diphtheria and anthrax, which brought him national recognition. In 1905 he published a study entitled "The Antitoxin Treatment of Diphtheria, with a Plea for Rational Dosage in Treatment and Immunizing," which received attention from physicians across the country.<sup>22</sup> When compiling data for the article, Royer did not narrow his focus to his hospital or even Philadelphia, but instead presented statistics from a number of cities and hospitals and compared treatment outcomes to those of his hospital. Based upon statistical evidence and experience, he argued forcefully for changes in diphtheria treatment and prevention protocols. In Royer's view, very large doses of antitoxin injected over the course of several days offered the best hope for patient survival. Moreover, he argued that family members and others in close contact with sufferers should be afforded antitoxin treatment even when not symptomatic. Finally, he advocated for large doses of antitoxin in cases where the disease was suspected but not yet confirmed by tests for the bacteria's presence in the throat, converting the antitoxin from treatment to prophylactic. His reasoning was clear: "The time to give [antitoxin] is when you have clinical evidence of diphtheria. Do not await a culture report; do not wait to see if you will have severe diphtheria. Give it at once." The antitoxin would do no harm in the event it was given to those not infected, but death might be the result of a delay in antitoxin treatment. Royer argued that physicians who delayed administering antitoxin "would find it exceedingly difficult to defend yourself in a court of law were proceedings brought against you for neglecting to give such a lifesaving agent until time had passed when it would positively cure your patient."<sup>23</sup>

Medical journals reprinted and cited Royer's findings for several years, and the Philadelphia health department implemented his dosage guidelines throughout the city, which resulted, according to the head of the department, in near elimination of "dissemination of the disease from the infected person to others surrounding him, either at hospital or in private houses."<sup>24</sup> In the early twenty-first century, standard of care insists that physicians who suspect, but have not had laboratory confirmation of diphtheria, administer antitoxin prophylactically.

In 1908 Royer published a series of articles on experiments he conducted at the hospital on patients suffering from anthrax and diphtheria. The first



article detailed the treatment of fifteen cases of anthrax with antitoxin serum, surgical drainage of lesions, and injection of antiseptic solution. All but two of the patients survived, and Royer claimed that his unprecedented use of Sclavo Serum, the most powerful anthrax antitoxin available in the world, was largely responsible for successful health outcomes in his treatment.<sup>25</sup> The work Royer carried out on anthrax would have been impossible were it not for the excellent bacterial laboratory at the Municipal Hospital, a fact he repeatedly stressed in the article. Two months later, Royer published the findings he and his laboratory chief made concerning the effect diphtheria antitoxin had on phagocytosis. Phagocytosis is the absorption of bacteria by immune cells. The experiments performed under Royer's direction included analysis of phagocytic activity in blood drawn before administering antitoxin and for up to three weeks after antitoxin injection. Royer also wished to understand whether diphtheria antitoxin was so specific that it held no efficacy against streptococcus and pneumococcus toxin. Royer concluded that the antitoxin had no effect on the phagocytosis of patients ill with streptococcus or pneumococcus, that the antitoxin's effect on phagocytosis was not uniform from day to day, and that the age and race of a patient did not influence the degree of phagocytosis.<sup>26</sup> Though no great breakthrough, his evaluations of phagocytosis offered a deeper understanding of immune system response relative to antitoxin use.

The final round of experiments Royer and his staff conducted at the hospital centered upon what he termed hypersusceptibility to diphtheria antitoxin. For years, clinicians noted that a second series of injections of diphtheria antitoxin often induced immediate and negative symptoms, though they were rarely fatal, in patients. The most commonly noted symptoms included swelling at the injection site, edema, full body rash, itching, and sometimes vomiting. Royer examined the phenomenon, taking special care to differentiate between the often-fatal collapses of the respiratory system a very small number of first-time injectors experienced and the mild symptoms, including facial flushing, associated with a second injection after a prolonged interval. Royer concluded that "spaced injections are errors in treatment and should be avoided because of unnecessary sickening," and therefore doctors should give "injections at close intervals, until the clinical evidence of the disease is well under control."<sup>27</sup> Royer's treatment protocol shortened the duration of the illness while it avoided the distressing symptoms of antitoxin sensitivity.

Throughout his tenure at Municipal Hospital, the dilapidated condition of the campus remained a constant source of concern. His 1906 report to

the mayor complained that “appropriations for repairs have been entirely too small to attempt anything excepting what is absolutely required to keep patients dry and warm.” The sewer beneath the scarlet fever hospital frequently backed up and flooded the basement with excrement while the condition of the smallpox isolation unit had deteriorated to such a degree that Royer used much of the building as storage while he constructed additional isolation sheds from rotten lumber taken from the original smallpox hospital. The nursing situation remained critical throughout his tenure because, as Royer summarized, the hospital functioned as a place young nurses used to gain experience before moving on to better postings, in part because private-practice nurses earned up to twenty-five dollars a week while his hospital paid nurses only thirty-five dollars a month.<sup>28</sup> In these miserable surroundings people lay ill and dying behind warped wooden walls that admitted icy breezes during winter and mosquitoes during the summer, in an atmosphere fouled by excrement flowing a few feet beneath their beds, attended by underpaid nurses who viewed the hospital—and their patients—as stepping stones to better jobs and whom Royer often caught hoarding the most effective stocks of diphtheria antitoxin for their own use should infection spread among the nursing staff.<sup>29</sup> After years of agitation on the part of the city’s public health officials and concerned physicians, and Royer’s more recent highlighting of the hospital’s shortcomings, the city opted to build a thoroughly modern facility and left it to Royer to draw up guidelines for the new campus, which opened in 1909.

One of the remarkable aspects of Royer’s time at Municipal Hospital was his willingness to remain even after it was clear the city did not intend to improve conditions. Royer was a strong candidate for a position in any hospital in the nation and had already filled such a post at Jefferson Hospital. Too, his brief stint as a professor indicated that a career in academia did not exceed his reach. Perhaps he envisioned service at the hospital as the surest way to conduct research and refine treatment protocols while making a name for himself beyond Philadelphia. Regardless of his motivations, the hospital presented the sort of public health challenge upon which Royer thrived, especially as this challenge came with the added privilege of authority: sole responsibility for the methods employed by his staff and, at only thirty-two years of age, management of a large institution. Royer, who lived on the campus, rose every day to face what modern epidemiologists term a “hot zone,” a location where acute, contagious disease spreads in human populations. No mere threat, the hospital lost several physicians, nurses, and other staff to

infections contracted while treating patients that other Philadelphia hospitals rejected as either too dangerous or too poor.

In 1905, as Royer published his first scientific studies, years of lobbying by reformers resulted in the replacement of the moribund state Board of Health with a powerful Department of Health. One of the minds behind the push for such a department was Dr. Charles Penrose, a noted Philadelphia gynecologist and brother to Boies Penrose, the state's most powerful Republican boss and a US senator. Charles extracted a promise from his brother that he would make every effort to ensure that the new department not become a dumping ground for political appointees.<sup>30</sup> For the first dozen years of its existence, successive governors and powerful bosses allowed this department, the most powerful in the state and headed by an executive who was, in Royer's own estimation, granted "greater power than was given to any other officer of the Commonwealth, save the Governor," to operate free of political intrigue.<sup>31</sup>

The first commissioner was an outstanding scientist and physician, Samuel G. Dixon, who had earned his law and medical degrees at the University of Pennsylvania, served briefly as a professor at the university, and by the mid-1890s headed the Academy of Natural Sciences of Philadelphia. In 1908 Dixon tapped Royer for a position in the medical division of the department with the title of associate chief medical inspector, a position that not only placed him as second in command in the division and one for which, according to Dixon, Royer was uniquely qualified because his time at the Municipal Hospital allowed him to enjoy "unusual opportunities for becoming familiar with the diagnosis of communicable diseases," but also placed him in command of the health department's epidemiologic work.<sup>32</sup>

Royer resigned his post at the hospital and by 1910 Dixon elevated Royer to chief medical inspector with responsibility for investigating infectious disease outbreaks throughout the state, recommending and ordering quarantine, and offering or ordering implementation of preventative techniques or equipment. In the space of thirty-six months, Royer emerged as one of the top two enforcers of state health policy. Royer's influence extended well beyond his official role because Dixon used him as *de facto* deputy commissioner and Royer became, according to one source, the state's executive physician, assigned any task Dixon saw fit.<sup>33</sup>

The relationship Dixon and Royer may have shared before Royer's appointment, if indeed they knew one another at all, is unclear, but Philadelphia was likely the nexus between the two men. Before his appointment by the governor, Dixon involved himself deeply in the scientific life of the city and

served on the school board as a medical advisor. When Dixon took the job as commissioner of state health, Royer had two years behind him as director of Municipal Hospital and even had they not been acquainted before 1905, Royer, in his capacity as the head of the state's largest public hospital for infectious disease, must have come to Dixon's notice. Dixon and Royer formed a complementary relationship; Dixon the folksy and affable head of Health, able to negotiate the minefield of state politics, and Royer, the technocrat who never failed to remedy a health menace and chastise those responsible. Indeed, a suggestion from Royer was an order from Dixon. Though Dixon commanded a department in a state intensely hostile to public health efforts, the department's unarguably positive results—and Dixon's insistence on publishing the department's victories against infectious diseases—combined with the commissioner's moderate, nonconfrontational approach to public health reform, and was rewarded by ever-increasing budgets. In 1905 the legislature voted \$186,000 for the department, a figure that grew to \$6 million by 1917.<sup>34</sup> By 1907 the department's performance so impressed the legislature that it earmarked \$1,000,000 for a comprehensive antituberculosis campaign that included dispensaries and sanatoria. From an initial 200 county health and sanitary inspectors, the department's workforce rose to include thousands of physicians, nurses, and inspectors whose duties ranged from nuisance abatement to the administration of hundreds of tuberculosis hospitals and dispensaries. In addition, 1,100 registrars of vital statistics, under the direct control of Dixon, aided the department in identifying and quantifying public health threats through statistical compilation of births, deaths, and causes of morbidity and mortality. Another great strength of the department was Dixon's care to keep the public informed about new steps the department planned to take and the results obtained by the department's activities, which helped set the public at ease about the broad police powers inherent in the bill that formed the department. By 1917 the department announced that in the previous ten years, deaths per thousand declined to such a degree that as many as 120,266 lives had been saved, mostly from infectious disease.<sup>35</sup>

Though the benefits to the state and its people were demonstrated in continually lower rates of morbidity and mortality for infectious disease, resistance to reforming the state's health system remained, and Royer and his colleagues faced sometimes-violent opposition. One reason for the pushback was rooted in the novel encroachments on private property that health reform entailed. Property owners, whether urban or rural, were accustomed to doing with their property as they pleased. The legislation

that created the Department of Health provided for inspection of property when certain infectious diseases or sanitary violations were suspected. Without such inroads into traditional private property prerogatives, the new department would have been little better than the old state Board of Health, which Dixon characterized as limited only to “educational and missionary” activities.<sup>36</sup>

Physical attacks against department personnel, if not frequent, were nevertheless a cause for concern. One health inspector near Reading suffered a skull fracture at the hands of a farmer who claimed the inspector had no right to invade his property to verify the sanitary quality of a stream that crossed from his property onto other farms. Another inspector who attempted to disinfect a house whose family produced a case of measles was subjected to an assault so savage that he lost an eye. A second major objection turned not on sacrosanct ideals of the inviolate nature of private property, but rather on traditional notions of disease causation and deep suspicion of particular scientific remedies, especially smallpox vaccination. Crowds in Waynesboro burned Dixon in effigy and denounced him as a “czar” and “dictator” even as the department attempted to squash a smallpox outbreak.<sup>37</sup> One of the men in the crowd, convinced by antivaccinationists that Dixon wished to kill his family through the vaccine, lay in wait at night to shoot Dixon—who fortuitously chose to not take his usual route, while the would-be assassin was discovered by a passerby.

The period 1908 through 1917 was the most varied of Royer’s professional life and encompassed almost the full gamut of public medicine and health activities. His experience in hospital management and institutional infection control allowed him to manage one of the state’s three large tuberculosis hospitals at Mont Alto and act as temporary director when regular managers resigned or fell ill. His position as chief medical inspector positioned him as supervisor of the state’s epidemic prevention efforts even as he refined regulations for epidemic control measures. Throughout his career, Royer devoted considerable attention to educating fellow health professionals and the public in the most efficient methods of infectious disease avoidance and treatment. To that end, he offered scores of lectures to professional and lay audiences on behalf of the Department of Health, many of which stressed that the key to the reduction of infectious disease deaths lay in the hands of the individual: proper washing, modern water sanitation, and voluntary isolation of the sick. Royer also continued to publish articles that highlighted the department’s role in efficient epidemic response and the role

of the department in treating tuberculosis, diphtheria, and other contagious diseases. A recurring theme in much of his writing stressed the importance of professional nurses, whom Royer believed key to controlling any infectious disease outbreak.

In 1917 the nation joined the war against the Central Powers and Pennsylvania became arguably the most important component of America's war effort. The state was a magnet for workers from the South and Midwest who sought positions in her industries. The migration, already underway by 1915, accelerated rapidly after the April 1917 declaration of war. The populations of industrial cities swelled—with Pittsburgh adding tens of thousands and Philadelphia adding hundreds of thousands—to their already crowded tenements. Space was at such a premium that boardinghouses routinely ran two and three shifts of boarders per day, per mattress. Railroads, coal mines, and steel mills converted railroad boxcars to bunkhouses with a hole in the floor as a toilet. Pittsburgh reversed its condemnation of houses to accommodate southern black newcomers. Even these quarters were preferable to the dank, windowless, and frequently flooded cellar apartments other workers occupied. By the end of 1917, the state was ripe for an epidemic.

Concomitant with the increase in public health work during 1917 was a decline in Dixon's health. Though the sixty-six-year-old retained his acute mind and spirit for work, he neared physical collapse and depended upon Royer as his eyes and ears, especially when he was admitted during the autumn of 1917 to the Hospital of the University of Pennsylvania. Nearly bedfast, Dixon still wrote weekly health tracts for newspapers across the world and demanded his personal secretary and clerks keep him apprised of the work of the department. He was diagnosed with a form of anemia and doctors treated him with a series of blood transfusions, the effects of which decreased as the months wore on. By January, Dixon accepted that no reverse in his decline was possible and he put his affairs in order. This may have included a recommendation for Royer to succeed him, but the record is silent on the point. On February 8, Dixon died. Within days of Dixon's death, the governor named Royer acting commissioner of health for the remainder of 1918. The forty-seven-year-old Royer had reached the pinnacle of the public health establishment in Pennsylvania and by virtue of his reach was one of the most powerful medical men in the nation.

Even before Dixon's death, the war kept Royer perpetually busy. The department he now commanded spearheaded efforts to control smallpox

outbreaks among Pittsburgh's African American war workers, inspected housing for armaments workers across the state, and aided the federal government in closing those saloons and brothels deemed too close to military camps and bases. His most important single assignment involved the military and federal government. The federal government selected Hog's Island, a few miles south of Philadelphia on the Delaware River, for the site of the world's largest shipyard. Before the project could commence, the vast swamp-land that constituted the site needed to be cleared of mosquitoes that, it was feared, might carry malaria or even yellow fever. Though malaria was almost unheard of in the city and yellow fever utterly absent, authorities feared their emergence among the tens of thousands of laborers who would one day man the fifty slipways. Royer took to the task with a single-mindedness that brooked no obstacles, especially the political barriers that so often arose when large projects were contemplated in Philadelphia. Royer relentlessly drained the swamps through the construction of main and secondary drainage canals, installed pumping stations, and sprayed kerosene to suffocate mosquito larvae. In an article detailing his efforts—and future efforts he hoped to undertake throughout the state—Royer asserted that “limiting the work to political subdivisions, operating independently, is not practicable.”<sup>38</sup> His attitude toward local political concerns presaged his attitude toward and treatment of local politicians and small business when the greatest epidemic in the nation's history, the influenza epidemic of 1918–19, emerged.<sup>39</sup>

The epidemic, first reported in Boston on August 27, was detected in Philadelphia as early as the first week of September. By September 20, the virus had entered every city in the state and was well along in its assault on most towns, villages, and mining camps. Without a strong federal public health service, each state and community met the epidemic in its own manner and according to its own resources. Unlike almost every other state, where local communities generally fought lonely battles against influenza with little aid from state health agencies, Pennsylvania chose to fight the epidemic under the aegis of a statewide, coordinated response because its health leader, Royer, chose to do so and possessed the power to implement his designs. The legislation that created the Department of Health permitted unilateral action, including quarantines, if the commissioner of health deemed it necessary, and further provided that “it shall be the duty of the Commissioner of Health to protect the health of the people of the State, and to determine and employ the most efficient and practical means for the prevention and suppression of disease.”<sup>40</sup> Between 1905 and 1918 the department enforced numerous family,

institutional, and community quarantines. Thus, legislation and precedent meant Royer needed neither the permission nor the consent of the governor or legislature to impose his epidemic response program. In the event, the governor, Martin Grove Brumbaugh, on vacation in Maine throughout the summer with his young bride, returned to the state only after the main sequence of the epidemic was underway.

The plan Royer devised to meet the epidemic had twin goals: preservation of lives through a rational, public health-based response and the unabated production of vital war material in the mines, factories, and mills. To meet these requirements, Royer opted not to slap an absolute quarantine on the state; rather, the order he issued is best conceptualized as a crowd ban, and Royer often referred to it as such. He directed the full force of the ban toward public entertainment venues: theaters, vaudeville houses, nickelodeon arcades, sporting events, and especially saloons. He left to local officials the decision to close houses of worship and schools if they believed it necessary—and most did take these steps—with some communities, for instance Bethlehem, isolating dormitories, coffeeshops, and other potential gathering places, too.

It is important to note that most historians, including Alfred W. Crosby Jr. in his work *Epidemic and Peace* 1918, and the more recent popular study by John Barry, *The Great Influenza*, misidentified the crowd bans as begun by Philadelphia and its health director, Dr. Wilmer Krusen.<sup>41</sup> Such an interpretation envisions the state's crowd ban as a series of local quarantines initiated by local officials. This was not the case as Krusen acted on Royer's orders and, like other local health officers, only ended the closure order when Royer permitted.

Even when local authorities closed schools and churches, the ban left a great deal of room for large businesses, public transportation, and most small businesses to operate. In addition to the crowd ban that went into effect on October 4, Royer ordered cases of influenza be reported to the state by nurses, physicians, and local health boards. Royer also urged communities to stock supplies, call for volunteers, and identify buildings large enough to serve as emergency hospitals, and noted that results in Boston suggested that placing patients in open-air settings reduced mortality rates.<sup>42</sup> To increase the supply of nurses, Royer closed 120 state tuberculosis dispensaries and released the nurses for local service.<sup>43</sup>

Royer's approach toward the fight against influenza fit well with the general theory and practice of anti-epidemic measures he and other officials



utilized during community outbreaks of other diseases. Though his actions might appear unremarkable during peacetime, Royer stood apart from most of the nation's states and many of its health officers, whose pronouncements regularly told the public that there was little to fear and later, after the public realized there was much to fear, that the worst was past and the epidemic nearly over. Furthermore, events encouraged local and state officials to comply with his orders as he was seemingly the only official prepared to offer solid answers to the disaster confronting the state.

In Philadelphia officials who often sparred with Harrisburg now spoke of the epidemic's effects on their wards in awed terms. Edwin Vare, South Philadelphia's political boss, told health officials that "conditions in South Philadelphia were worse than at any time in his experience" and that "the people were panic stricken, the doctors overworked, and many pharmacies short of the necessary drugs."<sup>44</sup> It appears that in this atmosphere of sickness and death, and the raw fear it produced, even politicians who jealously guarded their prerogatives—and Vare was undisputedly a jealous politico—yielded to the advice of Royer. Not a single word of protest emerged from political quarters in Philadelphia until nearly November, when some agitation for saloon and theater openings appeared.

In the parlance of the twenty-first century, Royer employed social distancing measures which, as an important University of Michigan study suggested, offered the chance to slow transmission of the virus and thus moderate the rapid morbidity curve that led to overwhelmed hospitals, nurses, and families and increased the case fatality rates and overall mortality rates communities suffered.<sup>45</sup> Indeed, twenty-first-century plans to meet an outbreak of influenza rely upon social distancing measures to reduce the rate of viral transmission between people.

The crowd ban constituted the passive element of Royer's plan to fight the epidemic. For the active portion of his plan, Royer aimed to respond to communities' requests for aid as much as conditions allowed. To facilitate the department's activities, Royer temporarily coupled it to the Pennsylvania Council for National Defense, an organization designed to react to war emergencies and one that maintained offices in every major community in the commonwealth, including most county seats. With the governor returned to Harrisburg and backing Royer's scheme, the council immediately provided Royer with clerks to manage the reports and pleas that arrived continuously by telegraph and telephone.<sup>46</sup> Not strictly subordinate to Royer, the council helped organize responses based upon Royer's requests. The council, for

instance, arranged for extra embalmers for communities overwhelmed by the unburied dead, moved a sealed train filled with medical students under cover of night from Harrisburg to the coal town of Pottsville, and collected pharmaceutical supplies.

The role the military assumed in the state's struggle with the epidemic was another anomaly and one that Royer fostered. In the best-known recent history of the epidemic in America, John Barry wrote that "the army, itself under violent attack from the virus, would lend none of its doctors to civilian communities no matter how desperate the circumstances."<sup>47</sup> As terrible as the epidemic was for civilians, the military's experience was far worse; camps hastily erected in the wake of America's declaration of war to train troops existed in a state of constant overcrowding. When influenza arrived in the camp, one case might turn into hundreds every day for weeks, with the worst-hit camps losing hundreds of men. Camp Crane, located in Allentown, proved the greatest exception to this rule. The only major camp to train solely medical personnel—ambulance drivers, medics, orderlies, and physicians—Camp Crane avoided the full force of the virus through close surveillance of barracks, immediate removal of confirmed and suspected cases of flu, and better general access to medical care both in the camp and on a per diem basis at a community hospital that lay across the street from the camp. The result was not only a relative handful of deaths, about a dozen, but also a large body of medical men trained to operate under emergency conditions and equipped with ambulances, efficient command and control, and stocks of highly mobile medical supplies. Yet even with these reserves of men and equipment, neither the army nor the camp's commanders offered their services. As Royer scoured the state for resources, he recognized the potential of Camp Crane.

Royer enjoyed a long association with the military beginning in 1911, when he was commissioned a lieutenant in the Army's Medical Reserve Corps, a commission he did not resign until 1927. His relationship with the military grew closer when, in April 1917, the Army promoted Royer to the rank of captain and appointed him chairman of the Harrisburg Army Medical Board, where he vetted the abilities of medical professionals called to serve, evaluated their physical fitness level, and recommended the rank each merited. In his recollections, which Royer penned in the third person, he wrote that his "joint relation with the U.S. Army . . . and his full authority as Commissioner of Health gave him permission to get release of many Army physicians."<sup>48</sup>

Royer convinced the army to provide more than 100 physicians for service in civilian communities. Some physicians undertook work at colleges and universities close to Camp Crane with several more engaged at an emergency hospital in Bethlehem, which treated the sick from the Bethlehem Steel Corporation's enormous mill complex, the largest producer of finished munitions in the world and a cornerstone of the Entente's war effort. Royer deployed most of the physicians, however, to the anthracite coal region to care for those whose bout of influenza was worsened by years of inhalation of mineral dust. Passing anecdotal evidence of the army's efforts appeared in one of the few literary works to examine the influenza epidemic. Author John O'Hara from Pottsville, fifteen years old in 1918, recounted the gray army ambulances and confident personnel from Camp Crane in his short story *The Doctor's Son*.<sup>49</sup> Doctors from the camp materialized as far afield as Altoona, 200 miles from Allentown, and positively contributed to Pennsylvania's anti-epidemic fight, with Royer coordinating their service, moving them from crisis to crisis as a general moves troops. According to the Department of Health, Royer managed to assemble 293 emergency hospitals staffed with 851 enlisted personnel and 125 Army physicians, all in a matter of six weeks.<sup>50</sup>

Notwithstanding the acting commissioner's efforts and experience, Pennsylvania counted tens of thousands dead by the end of October. It was impossible then—and remains an elusive proposition today—to quantify how many more deaths might have occurred had Royer not acted with such swift, strong measures. What could be quantified by local officials were the effects the closure order exerted on local economies; the crowd ban aimed to save lives and continue war-related manufacturing at all costs, even if the measures bankrupted elements of the local small-business community.

The ban fell most heavily on the politically and economically important alcohol and entertainment portion of local economies. The economic effect especially aggravated machine politicians who depended upon fees and pay-offs from saloons, speakeasies, brothels, bawdy houses, and theaters to pad their own salaries and ensure the smooth operation of the wards. Throughout his career Royer evinced little respect for political interests when they conflicted with the public health.

An additional tension existed between Royer and local governments and business communities: His disdain for alcohol. Not a prominent prohibitionist, Royer nevertheless shared with many of his medical contemporaries a dislike for a substance often believed at the root of the physical and psychological

deterioration they daily confronted in hospitals and during public health efforts. Several of the cases of anthrax and other diseases Royer highlighted in articles included endnotes that pointed to alcohol and delirium tremens as contributory causes to death. With prohibition almost a national reality and brewing suspended during the war to free up grain, labor, and railroad space for the war effort, all businesses connected to the liquor trade believed themselves under siege.

The city of Lancaster broke first from the crowd ban. Officials in the city of 50,000 pointed to an obscure clause of their city charter, which they claimed superseded state law. When the city fathers took the next step and reopened the saloons and theaters, Royer ordered the state police to block all roads into the city and ordered trains to detour around the city or, if moving through the city, not stop for transfers of passengers and freight. A county court sided with the city and ordered Royer to lift his roadblocks and allow train traffic, but he would not relent and Lancaster once again closed its entertainment venues and fell in line with the state ban; the economic toll of road and rail closures far outweighed the financial distress the ban caused. However, continuation of the ban faced a far greater challenge in Pennsylvania's second city.

In 1918 a Republican machine whose operational style remained almost unchanged by Progressive Era reforms possessed Pittsburgh. The machine jealously safeguarded a forty-year-old agreement with the state legislature that allowed Pittsburgh to operate largely outside state public health laws.<sup>51</sup> The public health and sanitary ramifications included the worst rates of morbidity and mortality of any large American city and a standard of living for workers even worse than that experienced by laborers in, for instance, the more famous hovels of Birmingham and Chicago. The city possessed no community hospital beyond a tuberculosis farm while its Board of Health was managed by a former city treasurer with no medical training. When the state imposed the crowd ban on October 4, city officials, the mayor included, professed no knowledge of the order and then attempted to delay enforcement. Pittsburgh enacted only the barest anticrowd measures and failed to close either schools or houses of worship until the end of the month and opened only a few very small emergency hospitals late in October. In fact, the head of the Pittsburgh board of health believed that by tracking sickness and deaths among pupils, the board might extrapolate the progress and severity of the epidemic in the city as a whole.<sup>52</sup> Royer urged more action, but as long as the city did not violate his ban order and continued to report cases of influenza, he could not compel action on the part of the city.

On October 29, as deaths and revenue losses climbed, the mayor of Pittsburgh, Edward V. Babcock, traveled to Harrisburg to request an easing of the ban in his city. Royer denied the request and during the last third of October and the first third of November, Babcock and Royer traded accusations and insults. Babcock offered as his reasons the obvious (to his mind) failure of the ban to control the disease and his own position as the duly elected leader of the city of Pittsburgh, with both claims ignored by progressive citizens' groups and Royer.<sup>53</sup> The health commissioner countered the mayor's arguments by pointing to the clear mandate within the 1905 state health department legislation and the peculiar requirements of wartime production.

Royer deftly positioned those who wished to defy the ban as poor American citizens who chose alcohol and entertainment over the needs of the sons of the nation who were in the fight of their lives in Europe. In the Pittsburgh newspapers, Royer proclaimed that "liquor interests stand alone in their efforts to lift the order and in their total disregard for public health and welfare." He exhorted women, often viewed by public health officials as a first line of defense against disease, to demand their husbands support the closure order. Royer also launched, because 1918 was an election year, a series of scathing critiques of politicians who used the ban to further their own political aims. Royer appealed to the better instincts of his fellow citizens when he implored them to not pull "political chestnuts out of the alcoholic flame" by supporting anticrowd ban politicians in the upcoming elections.<sup>54</sup> So important was the fight in Pittsburgh that US Surgeon General Rupert Blue threatened to declare Pittsburgh a "military district" and close all saloons and theaters for the duration of the war, with Army infantry patrols used to enforce the closures.<sup>55</sup> Royer sent state investigators to the city and an Allegheny County judge promised to support the Department of Health and send ban violators to prison and pull liquor licenses from any business that did not comply with the commissioner of health.

The fight over the ban that raged between the state and the city acquired the trappings of a personal battle between Babcock and Royer. Legally, Royer stood on firm footing; nothing less than a change in the law by the legislature or a ruling by the state supreme court could overturn the ban. Perhaps the strength of the legislation prompted Pittsburgh officials, especially the mayor, to concentrate pressure on Royer, including personal attacks, rather than a court injunction, to end the ban. As November began, recriminations flew between the men and their respective backers. Babcock characterized Royer as "drunk with power."<sup>56</sup> Furthermore, wrote Babcock, a "pall"

hung over his city, the direct result not of the epidemic, but of the crowd ban.<sup>57</sup> A progressive group, the Citizen's Political Union of Pittsburgh and Allegheny County, contradicted the mayor and insisted that "the depression in our city caused by deserted assembly places by reason of the ban is not to be compared with the terror in the city caused by the spread of the disease."<sup>58</sup>

The bickering in Pittsburgh was not simply a spat over local and state prerogatives, but clearly underscored the resistance of Old Guard, machine politicians to the power of and reforms championed by public health leaders and progressive political groups. The war effort, which the ban helped protect, added another dimension to Royer's efforts to preserve the ban. In Royer's estimation, decent citizens faced the obligation of pitching in no matter the economic and social costs. A former assistant surgeon general of the USPHS, A. J. Lanza, who supported the uniquely strong Pennsylvania ban, echoed Royer's views when he suggested that when "General Pershing cables for guns and ammunition we cannot tell him that we cannot send the supplies because we did not quarantine a city for fear it would be an inconvenience to the merchants and saloon men."<sup>59</sup> Royer tied his state's fight against the epidemic directly to a much broader fight on the battlefields of Europe. In the end, these two willful men, Babcock and Royer, personified a conflict between two paradigms, one founded upon nineteenth-century notions of local control, including antiquated notions of epidemic control, while the other was science-based and demanded that the disciples of the new public health be granted broad latitude to meet epidemics and other threats to the public's health, regardless of political concerns.

In January 1919, long before the last embers of the epidemic died, the term of Governor Brumbaugh came to a close. The new governor, W. C. Sproul, might have renewed Royer's appointment, as had the three previous governors, but declined. The reasons are difficult to pin down, and no documentation exists to confirm suspicions, but the logic can be guessed. Royer was the new face of the department, a visage less respected than Samuel Dixon. Though a Republican, Royer was unpopular with the political leaders of Pittsburgh, Allentown, Lancaster, and certain corners of Philadelphia. The mayor of Pittsburgh was an ally of Senator Penrose, and Penrose may have influenced Sproul's decision to release Royer. Indeed, the crowd ban nearly hamstrung Sproul's election campaign in its last months; with saloons closed, the ward bosses faced difficulties organizing their constituents for the ballot box, especially in Pittsburgh, while the prohibition of crowds put a halt to stump speeches. Sproul's Democratic opponent, Judge E. C. Bonniwell,

exploited the limitations the crowd ban placed on his opponent's campaign. For instance, Sproul faced accusations that he backed the ban on alcohol, with some Bonniwell supporters suggesting to steelworkers that even though doctors believed whiskey might save them and their families, they were forbidden from prescribing it because of Royer's order.<sup>60</sup>

The end of Royer's tenure marked the conclusion of an important chapter in the history of Pennsylvania medicine; the next director, Dr. Edward Martin of Philadelphia, was a purely political appointee who more than ten years before led the Philadelphia Department of Health and Charities. Not a bad physician, Martin was sixty years old at the time of his appointment and not a technocratic public health visionary in the mold of Dixon or Royer. He was, however, conservative and possessed a long record of complacency in the face of political pressure. In Pennsylvania, political payback and political reward—the sacking of Royer and appointment of Martin—reflected two sides of the same coin. Martin's appointment opened an era in which the state Department of Health might be considered competent, but not visionary, a state of affairs that continues through the early twenty-first century.

In February 1919 Royer was an unmarried forty-eight-year-old whose decade-long association with the state Department of Health was finished. That month, Ursinus College conferred an honorary doctor of science degree upon him, his testimonial read by Dr. Wilmer Krusen, head of the Philadelphia Department of Health and, in the late 1890s, Royer's preceptor. Krusen praised Royer for his dedication to science and medicine and said, in part, "During the past year . . . he administered the laws in fighting, with vigor and effect, the worst epidemic disease in modern times, and organized relief for the sick in many parts of the state with great dispatch, saving many lives."<sup>61</sup> At this juncture Royer might well have retired from public life and enjoyed a long retirement, or perhaps begun a modest private practice or a professorship. An event nearly a thousand miles away, however, intervened and set his life upon its course for the next twenty years.

The port of Halifax, Nova Scotia, was a major gathering point for convoys of men and equipment headed to Great Britain during World War I, its waters crowded with vessels waiting for escort while ashore the dockyards bustled with all manner of commerce. The port of Halifax was really two ports: The eastern portion, which bordered the Atlantic Ocean, was called Halifax Harbor with a slender strip of water called the Narrows connecting it to a large interior port to the west called Bedford Basin. The Narrows separated Halifax from the smaller city of Dartmouth, and both looked toward

the port for their livelihoods. On December 6, 1917, the French freighter *Mont Blanc* collided with the Norwegian freighter *Imo* in the Narrows. The *Mont Blanc*, heavily laden with thousands of tons of gun cotton, cordite, powder charges, shells, and barrels of benzol, drifted for twenty minutes toward the piers of Halifax. The thick, black smoke that poured from her holds prompted thousands of people to move toward window and waterfront to watch the spectacle.

The detonation of the *Mont Blanc* was catastrophic; the ship disappeared between blinks of an eye, and pieces that weighed several tons landed more than three miles away, the rain of hot metal igniting fires throughout the cities of Halifax and Dartmouth. The blast constituted the largest manmade explosion in history until the 1945 atomic test. The force of the explosion raised a tsunami sixty feet high that destroyed a Micmac Indian settlement on the harbor's edge. Photographs taken in the minutes after the explosion captured a mushroom cloud rising thousands of feet above a boiling maelstrom of smoke and fire. More than 1,600 people died in the first seconds following the explosion, with bodies thrown upon roofs, buried under rubble, and tangled in trees. Scores more lay buried alive under mounds of rubble, doomed to a miserable death from the cold, wet December weather. The pressure wave the explosion caused rushed out in all directions and caught people looking out windows unprepared. The concussion shattered thousands of windows and sent glass into the eyes of schoolchildren and office workers and transformed Halifax into the West's blindness capital. The city pressed partially destroyed buildings into service as morgues, with bodies in one location and parts of bodies in another.

The response from Canada and New England, especially Boston, overwhelmed the city. Within only a day, a train filled with supplies left Boston, followed by volunteers and donations. A year after the explosion, more than \$250,000 remained unspent and officials in Halifax and Massachusetts decided to use the money to improve the city's public health and established the Massachusetts-Halifax Health Commission.<sup>62</sup> In October 1919 the commission asked Royer to act as its chief executive officer, responsible for all public health operations in the city. Royer accepted and moved immediately to Halifax, where his experience in overseeing citywide public health operations under trying conditions—and in the case of Halifax this included not just a blasted city but one with a growing smallpox epidemic when Royer arrived—perfectly suited him to the task he faced. His first major undertaking was the opening of Health Center no. 1 in the Admiralty House,



a grand three-story stone house originally built by the Royal Navy in the early nineteenth century to house the fleet admiral when he was in Halifax. Though it suffered serious damage from the blast, workers repaired the building and provided the only available substantial structure that might offer space for medical outreach within the “devastated zone,” as officials called the area closest to the explosion.<sup>63</sup> The Admiralty House became a center of public health efforts with rooms for prenatal and neonatal work, tuberculosis examination, “psychopathic” rooms for people suffering adverse reactions to the blast and its aftermath—what modern physicians term post-traumatic stress disorder—and general administrative offices, and was followed by two other centers and several substations in the years that followed.<sup>64</sup> The task before him, however, required not only health stations but a systematic, city-wide approach to public health and public medicine that carried healthcare work to the community, a model never before tried in Halifax.

The task of carrying healthcare to the community highlighted Royer’s multifaceted, scientific approach to public health. He cut Halifax and Dartmouth into districts, with each district assigned a public health nurse. Always an ally of nurses, and women in general as key to public health efforts, he most relied upon trained nurses at Halifax. The nurses of Halifax, he wrote, were “responsible for the entire public health program in the district assigned to her, and for the health of every member of each family with whom she comes in contact.”<sup>65</sup> Women fairly ran the health centers and substations and, when Royer founded a well-baby clinic, he hired a female dentist who had long experience treating children and declared that, with regard to baby welfare stations, he considered nurses as having “as much or more value than doctors.” To maintain a pool of nurses, Dalhousie University appointed him a professor in the school of medicine in 1920 where he taught courses on medical jurisprudence and, crucially, founded and directed Canada’s first program in public health nursing, a six-month-long postgraduate course of lectures and fieldwork.<sup>66</sup> Many of the graduates remained in Halifax to carry out the work of the commission under Royer’s careful eye and that of another Pennsylvanian, a nurse from Tunkhannock named Jessie Leona Ross. Ross, thirty-nine years old in 1920 when Royer appointed her chief nurse for the commission, was considered one of the most experienced public health nurses in Pennsylvania, with decades spent as a tuberculosis nurse, past president of the state’s nursing association, and head of state child welfare programs during World War I. Whatever the nature of their relationship before her appointment by Royer in 1920, they were married on July 19, 1923, at the

American Consulate General and remained, until her death, closely entwined personally and professionally.

Research and publishing played a prominent role in every appointment Royer accepted, and his time in Halifax proved no exception. In the main, the articles and lectures that emerged from his three-and-a-half-year stay in Halifax highlighted the manner in which commission-funded efforts reduced morbidity and mortality, offered instruction to the community, and increased the standard of living for all Halifax, all written in dry, scientific terms. He offered one address at the annual meeting of the Provincial Council of Combatting Venereal Diseases in early summer 1920, however, that outlined the best methods of venereal disease control while mixing the moral convictions of a confirmed Christian with a strikingly frank discussion of human sexuality and included pointed remarks concerning gender double standards. He recognized the need to work with courts so that the “immoral and criminal classes” might be treated while confined for trial or punishment and, in a novel twist, suggested some criminals be offered suspended sentences in return for venereal disease treatment. In his estimation, however, more important than treatment was education about venereal disease, and its often-understated consequences, and the banishment of the mythology that he believed surrounded sex and sexuality. The myths—for instance the fear that male orgasm while sleeping dissipated a man’s essence, that celibacy might lead to serious sickness, or that “there should be a double standard of morals,” one for men and one for women—were designed to “exonerate the weak and impure man who so often comes to the marriage bed after having fallen times without number, and expects to meet there a virgin mate.”<sup>67</sup> Royer continued that “only when you have come to insist that what is fair and just for the male is fair and just for the female” would society manage to preserve the purity of youth for procreation in marriage.

Though his address expressed egalitarian notions, his general thrust was toward ensuring proper marital relations and healthy offspring. Of couples who wished to avoid pregnancy for “selfish or prudential motives,” Royer accused them of “treason to society, treason to humanity.” The address was the most personal explication of Royer’s views on gender, sex, and sexuality and offered a tantalizing glimpse of a man who believed that modern society must confront sex in an honest, science-based manner even while he remained committed to orthodox views surrounding intercourse as an act reserved for marriage and expressly designed, through “the Providential plan for bringing a family into life.”<sup>68</sup>

As Royer continuously refined the commission's operations and Halifax slowly recovered from the explosion, North American public health experts, including the Rockefeller Foundation, studied its activities.<sup>69</sup> He turned now to problems of infrastructure and lifestyle. An expert in water treatment, Royer surveyed the watersheds and sterilization methods of Halifax and Dartmouth, pronounced them polluted, and prescribed a switch from chloride of lime to liquid chlorine, the standard chlorine delivery system in most American and Canadian cities.<sup>70</sup> In a further reflection of his experience in Pennsylvania, Royer recommended a system of tuberculosis hospitals and dispensaries for the city and urged the construction of a municipal infectious disease hospital. Ever mindful that much of the good a public health program accomplishes stems from educating the community, Royer directed much of the commission's energy toward instruction of families in basic hygiene and lifestyle choices. Concomitantly, the nomenclature he employed to describe the goals of such programs offers scholars a small but important window onto his personal views of health maintenance and personal morality. Of the physicians in Halifax who opposed pasteurization of milk, Royer wrote that "a good deal of backward education has to be overcome."<sup>71</sup>

Public health education also meant breaking unhealthy habits in the community. For instance, Royer charged the nurses of his Tuberculosis Service to impress upon their patients the "lessons of right living." In another minor attempt at social engineering, Royer divided the spacious grounds of Health Center no. 1 into thirty garden plots where, he hoped, families who lived in tenements might "acquire a taste and desire for a real home with a garden," even if he failed to acknowledge that such accommodations remained financially unrealistic for tenement populations. Royer also wished to introduce the middle-class university student to volunteerism and duty at the Dalhousie University health station, hoping to ensure that "students will have an opportunity to acquire the right attitude of mind toward community service."<sup>72</sup>

Perhaps his only major deviation from a community-wide approach to public health was his treatment of "Africville," an Afro-Canadian slum filled with people long shunned by Halifax's white population and now homeless, too. The poorest segment of the population, Africville merited only a substation and periodic visits by a nurse. The soft racism of North America's progressives informed the quality and quantity of aid Halifax's blacks received. Defects aside, by the time Royer resigned in mid-1923, the health commission credited him with halving the overall death rate, from 20 per 1,000 to 11.7 per 1,000, an annual savings of 480 lives for four straight years.<sup>73</sup>

His return to the United States did not signal a lessening of his public health labors. During 1924 Royer surveyed nineteen cities in the western United States on behalf of the American Child Health Association, which published his findings as part of a compendium entitled *A Health Survey of 86 Cities* in 1925. The volume is the most detailed single examination of child welfare in small- to medium-sized cities during the early postwar period. A year later the National Society for the Prevention of Blindness appointed him medical director. The appointment came at least in part as a result of his work in Halifax, the aftermath of which the Society watched closely. Already a budding expert in the treatment of eye injuries caused by trauma, he threw himself into the mission of understanding blindness, especially blindness prevention in children. In his capacity as medical director, Royer oversaw all aspects of the Society's national program and reached forcefully into new territory. Drawing on his experience in Pennsylvania, he lobbied industries to adopt safety glasses and update lighting to reduce eyestrain. As children always loomed large in Royer's public health efforts, he championed inspection of schoolchildren for vision defects and advocated well-lit classrooms so that children might avoid falling behind in their studies for want of proper eyesight.<sup>74</sup> For six summers, Royer offered ten-lecture courses on the topic of blindness and its prevention at major universities, including Columbia, Tulane, and Chicago, and offered an extraordinary sixty scholarly papers and lectures and fifteen radio lectures.

Royer took particular pride in his outreach to physicians and public health officials at all levels of government and understood how these professionals thought and what might motivate them to act upon his concerns. Royer was not concerned with guarding his organization's turf, but rather defeating blindness in the most efficient manner, which meant interagency cooperation. In 1935, after he retired from the Society, Royer wrote a piece in their *Proceedings* in which he explicated his vision of a campaign against blindness through the combined efforts of multiple agencies, a campaign he orchestrated as medical director. The "best results," he believed, "may be achieved through conference of all groups, official and volunteer, in states and municipalities that have a contribution to make to conservation of sight and prevention of blindness."<sup>75</sup>

Shortly after he assumed the medical directorship of the Society, Royer issued a major challenge to public health officials, clinicians, and scientists to evaluate the body of knowledge related to trachoma. Trachoma is a bacterial infection of the eyes, often associated with the bacteria species that produce chlamydia and gonorrhea, though other bacteria also play a role. Symptoms,

which usually manifest shortly after birth or in early childhood, include soreness, exudate, and scarring of the eye, which had led to vision impairment and blindness for millions of Americans.

Royer viewed trachoma as simply another disease with serious consequences for sufferers and society and therefore in need of prevention and cure, and his previous statements on venereal disease presaged his open and blunt approach toward discussing trachoma with medical professionals and the public alike. Trachoma's association with venereal disease resulted in doctors avoiding the topic with their patients and diminished the likelihood of rapid treatment. In his first major address on the disease, in 1926, Royer highlighted for his peers the role "common wisdom," unsupported by scientific study, played in their understanding of trachoma, including conclusions about the disorder's etiology, contagiousness, and treatment and challenged them to reexamine their work and discard unsupported theories. He went on to suggest that "some reports alleged to be epidemiological studies are mere surveys of prevalence." Royer challenged physicians, public health services, and governments to allot the necessary resources to rid the world of "perhaps the greatest single cause of vision impairment and blindness."<sup>76</sup> Less than a year later, Royer devoted an entire article to the role venereal infections played in the sight impairment and blindness of both children and adults, and impressed upon his audience that not everyone struck low with venereal-associated vision problems bore the "stigma of immorality."<sup>77</sup>

His efforts bore almost immediate dividends; by 1931, his next major article on the subject happily acknowledged that he might now discuss the link between venereal disease and blindness before groups of physicians and social workers without fear of giving offense.<sup>78</sup> Furthermore, both groups acknowledged tracing perhaps 15 percent of cases of blindness to venereal disease with several times that number of nonblinding vision defects traceable to venereal disease. Royer also noted that states and physicians had moved toward greater control of trachoma and its fellow travelers.

The progress against the disease that affected millions, regardless of social class and color, was the result of a coordinated assault. The first step was to initiate scientific investigation of the disease. As new data, unfettered by antiquated notions of the disease's etiology, emerged and confirmed the role of venereal disease in blindness, his focus shifted to public health measures. Most important, he led a campaign to promote the use of silver nitrate drops as an integral part of the birthing process. Doctors had for years understood that a drop of silver nitrate in each eye immediately after birth lessened babies' chance of developing what laypeople termed "babies' sore eyes," and

what clinicians understood as trachoma.<sup>79</sup> A single drop ended the danger of blindness from almost every bacterial species that might gain entry to the newborn's eyes during birth, but parents, doctors, and midwives often neglected the drops because they disbelieved or misunderstood its efficacy.

Convincing physicians to standardize use of silver nitrate was relatively uncomplicated, but parents and midwives often remained unconvinced. To reach these populations, Royer oversaw a program of pamphlet distribution, every one of which included a sketch of an infant with infected eyes and a mother trying to decide upon a course of action. Alternatively, pamphlet sketches depicted older children lamenting the fact that though their mothers recognized they suffered from sore eyes as infants, their mothers refused to seek a physician's aid and silver nitrate drops, and their blindness and stunted lives were the direct—and inexcusable—result. He also lobbied legislatures for passage of state and local laws requiring the use of silver nitrate and inspection for the disease in public schools, and for stronger enforcement of the laws already on the books that governed silver nitrate use. Nationally, the campaigns against trachoma and other venereal disease–related causes of blindness, inspection of schoolchildren, and industrial-accident blindness prevention increased the rate and quality of research, raised awareness through education, and dropped rates of blindness nationally. As always, Royer utilized nurses in the education and inspection programs of the Society, especially with regard to children.

As he waged his fight against trachoma, Royer also founded a committee dedicated to compiling as much statistical data about blindness during all periods of life and using that data to effect prevention and treatment programs. So extensive and reliable were the data compiled by the committee that the National Security Board used the Society's statistics to classify degrees of disability, and therefore relief, for the blind and sight-impaired.<sup>80</sup> In this instance, the remarkable fight Royer led against blindness in all its forms was carried, through the apparatus of the New Deal, to every sight-impaired person in the nation; the amount of government assistance one received depended upon gradations of impairment devised by Royer and his colleagues at the Society.

In the midst of his work for the Society, Royer's wife and partner in public health work fell ill. During the late 1920s Ross-Royer worked alongside her husband at the Society and was charged by the Society with developing a vision test for preschool children. Ross-Royer's product was brilliant; she developed a game based upon ophthalmologist-designed vision charts that

worked for testing not only the vision of normally developed children, but also illiterate youngsters and children who did not speak English. According to Royer, physicians and public health officials across North America praised the test. By 1932 Ross-Royer was clearly ill, though the nature of her sickness remains unclear. Royer resigned from the Society in early 1932 so he might personally care for his wife when she slipped into infirmity at their home in Tunkhannock, Pennsylvania, for the next ten months. In October 1932 Ross-Royer died and was buried in a solitary grave. Royer remained in the town through 1936, close to her family who were prominent members of the town's society.

In March 1933 Royer offered to assist in the organization of the Pennsylvania Emergency Child Health Committee, conceived in response to the privation of the Great Depression. The head of the committee was Dr. Samuel McClintock Hammill, president of the American Child Health Association and former head of the American Pediatric Society, and he accepted Royer as his First Vice President. The committee was run through subcommittees in every county in Pennsylvania but was centrally managed as a joint venture between the Pennsylvania Emergency Relief Board and the Medical Society of the State of Pennsylvania. By his own count and for no salary, between 1933 and 1936 Royer visited each of the state's sixty-seven counties at least ten times to coordinate activities of local committee members, survey the needs of children either on state relief or candidates for such relief, and act as a go-between bridging the gap between Harrisburg and the rest of the state. In three years Royer delivered lectures before forty-two medical societies and more than a hundred more lectures before public health groups and concerned citizens, and sent roughly 1,000 handwritten notes and reports to President Hammill.<sup>81</sup> The testimony of the Society, largely based upon county-level statistical analysis on childhood malnutrition and other major medical disorders, was part of congressional testimony during the hearings on the Economic Security (Social Security) Act of 1935. In 1936 Royer resigned his role in the Society and married Nellie (Geiger) Kauffman. They married in her family's ancestral farm in southern Franklin County, the place of Royer's birth. He left his home in Tunkhannock for what would become his place of residence until the end of his life. In 1937 Royer acted as president of the Pennsylvania Council for the Blind while the elected president recovered from an illness, and between 1938 and 1939 he served as chair of the Franklin County Child Health Committee.

Just as Royer appeared reconciled to retirement, war once again stirred his patriotism and compelled him to petition the Procurement Board in Washington, DC, to place him in any capacity in any of the uniformed armed services or the US Public Health Service. The government declined his request because of his advanced age, but the continued drain of doctors from Pennsylvania in 1942 prompted the Department of Health to enlist Royer as a physician at the Mont Alto tuberculosis hospital in December 1942. In April 1943 the state requested Royer take over as medical director at the Cresson tuberculosis hospital nestled in the mountains about seventy-five miles east of Pittsburgh. Royer instituted a regime of strict quarantine measures in the hospital to limit cross-infection between the advanced, infectious cases among the patient population and those patients who were recovering or asymptomatic. His scheme merited a combined audience of the Blair and Cambria County medical societies and was met with a unanimous endorsement by all those present. His address was reprinted in the *Bulletin of the Cambria County Medical Society*. Regardless of his quarantine measures, the positive health outcomes of tuberculosis patients steadily increased during his tenure as a result of new therapies. In 1947 the use of the antibiotic streptomycin radically altered the topography of tuberculosis control. On September 1, 1947, the state removed Royer from his medical directorship and made him special medical advisor to the Division of Tuberculosis Control.

The position of special medical advisor conferred to Royer the responsibility of overseeing statewide efforts to isolate noncompliant pulmonary tuberculosis patients from not only the public, but from their families, too. As he had done thirty years before during the influenza epidemic, Royer labeled patients unwilling to follow treatment protocols and isolation measures a threat to public health. He paid particular attention to the eastern counties of the state, where, with the exception of Philadelphia County, public health officials and private physicians frequently adopted only weak patient control measures for tuberculosis cases though state law permitted isolation and control of movement. Again, Royer employed his method of educating medical professionals and interested laypeople, including the patients, to the dangers of active pulmonary tuberculosis cases in the community. Indeed, he informed tuberculosis case workers that until they “welcome restrictive measures when indicated they are only talking and playing with what is a real public health problem.”<sup>82</sup> He turned then to tracking



the movements of infectious cases, noting their employment and housing situation. He next offered a carrot; patients could voluntarily enter treatment programs, sometimes at a local hospital or dispensary, though many faced a long convalescence in one of the remote state tuberculosis hospitals. Patients who refused to comply faced forced quarantine in home or hospital, and though most complied, Royer admitted he arrested and even jailed those whose resistance proved too entrenched for more mild measures. There can be little doubt that Royer viewed such imprisonments as perfectly justified in the interest of public safety, especially as it was imposed only as a last resort against people to whom he extended choices other than jail.

In 1948 Royer resigned his position with the Division of Tuberculosis Control, the last position of his career. Now seventy-eight years old, Royer was but a year shy of fifty years of medical and public health practice, spanning the entirety of the first half of the twentieth century. He returned to Franklin County where he and his wife made their home in Greencastle, only miles from the home of his birth. Their house, a red brick three-story structure constructed in 1930, bespoke an upper-middle-class lifestyle. Throughout the last decade of his life, Royer busied himself with his genealogies and local historical pursuits, acting as a director and vice-president of the county historical society from 1950 through 1959. He did not venture again into the public health arena, one of many decisions one wishes Royer had explained in a personal journal. With his affinity for history and genealogy, Royer likely reflected upon his life and the role his life played in creating the modern health conditions in the towns and farms he left in the mid-1890s. In myriad ways, Royer guided and sometimes imposed change on cities and the state—and later the nation—especially with respect to contagious disease prevention and treatment. On February 16, 1961, B. Franklin Royer, age ninety, gathered up his winter clothing and a snow shovel. A short time later his wife noticed him slumped in the snow.

B. Franklin Royer remains, with Samuel G. Dixon, one of the two most important medical figures produced by Pennsylvania. Indeed, in terms of lives saved, Royer's work far outdistanced that most celebrated of Pennsylvania-based physician-scientists, Jonas Salk. His career, however, and the effect his career exercised on the lives and health of millions of Pennsylvanians, Canadians, and the blind are entirely overlooked by historians. Yet each stage of Royer's professional development offers fruitful ground for scholarly research. Viewed through the sweeping lens of an

entire life, the trajectory of his career progressed from that of a mid-level public health officer in an American metropolis with a decidedly inefficient board of health, to a high-ranking health officer of the nation's second most populous and industrial state, a state newly equipped with a strong health department and legislation to back its mandates. Every opportunity to influence the public's health in the years that followed might be traced to his time in Pennsylvania, particularly his tenure in the Department of Health. Most insightful during that period was his fight against influenza, which highlighted his struggle to place the new science of medicine above the political inertia of the past and Royer's passion for public service. The epidemic also cast light upon another, less fortunate trait—his inability to view a political debate about the public's health in terms other than right and wrong; his position, which served him well in hospital and as the department's executive officer, emerged as a weakness during the fight over the crowd ban in Pittsburgh.

Royer was a progressive insofar as he believed in a technocratic approach to the solving of society's ills allied to clean government. His reliance upon science and the use of statistics fit neatly into the general trend among early twentieth-century medical experts to demand quantification of disease prevalence and the efficacy of treatments rather than reliance upon common wisdom and simple personal experience. Furthermore, Royer advocated for the place and importance of women as professional nurses in public health and medicine and enlisted the aid of women in combatting public menaces in their communities and homes. Concomitantly, he evinced conventional, but nevertheless disappointing indifference to the plight of, for instance, blacks in the aftermath of the Halifax explosion, whose community he largely ignored during his public health efforts. He tended also to write off the intelligence of people who failed to follow what he believed were indisputably good habits of living, such as those who expectorated on sidewalks and in train cars or people whom he believed willfully (and, no doubt, in his mind criminally) ignored tuberculosis laws. Yet, these failings must be balanced by a broad view of a life lived, from the age of twenty to the age of ninety, in the service of his fellow-citizens. Despite his varied achievements—and the long period of those achievements—historians and Pennsylvania allowed memory of his work to slip, almost unnoticed, into oblivion. Indeed, the website of the Pennsylvania Department of Health fails to even place his name or photograph in the list of the state's directors of health.

## NOTES

This article benefitted immeasurably from the efforts of the late Professor William Pencak, who happily took the time to advise a person he never met, about how to make an essay he never saw completed, better.

1. John Duffy, *A History of Public Health in New York City, 1866–1966*, vol. 2 (New York: Russell Sage Foundation, 1974); Judith Walzer Leavitt, *The Healthiest City: Milwaukee and the Politics of Health Reform* (Princeton, NJ: Princeton University Press, 1982).
2. James H. Cassedy, *Charles V. Chapin and the Public Health Movement* (Cambridge: Harvard University Press, 1962).
3. Sam Alewitz, “*Filthy Dirty*”: *A Social History of Unsanitary Philadelphia in the Late Nineteenth Century* (New York: Garland, 1989); John F. Bauman and Edward K. Muller, *Before Renaissance: Planning in Pittsburgh, 1889–1943* (Pittsburgh: University of Pittsburgh Press, 2006); Jacqueline Karnell Corn, *Environment and Health in Nineteenth-Century America, Two Case Studies* (New York: Peter Lang, 1989); S. J. Kleinberg *The Shadow of the Mills: Working Class Families in Pittsburgh, 1870–1907* (Pittsburgh: University of Pittsburgh Press, 1989); Joel A. Tarr, *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective* (Akron, OH: University of Akron Press, 1996); Joel A. Tarr, ed., *Devastation and Renewal: An Environmental History of Pittsburgh and Its Region* (Pittsburgh: University of Pittsburgh Press, 2011).
4. J. H. Powell, *Bring Out Your Dead* (Philadelphia: University of Pennsylvania Press, 1949); Thomas Apel, “The Rise and Fall of Yellow Fever in Philadelphia, 1793–1805,” in *Nature’s Entrepot: Philadelphia’s Urban Sphere and Its Environmental Thresholds*, ed. Brian C. Black and Michael J. Chiarappa (Pittsburgh: University of Pittsburgh Press, 2012).
5. Michael P. McCarthy, *Typhoid and the Politics of Public Health in Nineteenth-Century Philadelphia* (Philadelphia: American Philosophic Society, 1987).
6. William Pencak, “Free Healthcare for the Poor: The Philadelphia Dispensary,” *Pennsylvania Magazine of History and Biography* 136, no. 1 (January 2012): 25–52.
7. Barbara Bates, *Bargaining for Life: The Social History of Tuberculosis, 1876–1938* (Philadelphia: University of Pennsylvania Press, 1992).
8. Karol K. Weaver, “She Knew All the Old Remedies’: Medical Caregiving and Neighborhood Women of the Anthracite Coal Region of Pennsylvania,” *Pennsylvania History: A Journal of Mid-Atlantic Studies* 71, no. 4 (Autumn 2004): 421–44; Karol K. Weaver, *Medical Caregiving and Identity in Pennsylvania’s Anthracite Region, 1880–2000* (University Park: Pennsylvania State University, 2011).
9. Robert P. Wolensky, Kenneth C. Wolensky, and Nicole H. Wolensky, *The Knox Mine Disasters: The Final Years of the Northern Anthracite Industry and the Effort to Rebuild a Regional Economy* (Harrisburg: Pennsylvania Museum and History Commission, 1999), and Robert P. Wolensky and Joseph M. Keating, *Tragedy at Avondale: The Causes, Consequences, and Legacy of the Pennsylvania Anthracite Industry’s Most Deadly Mining Disaster, September 6, 1869* (Easton, PA: Center for Canal History, 2008).
10. Barbara Gutmann Rosenkrantz, *Public Health and the State: Changing Views in Massachusetts, 1842–1936* (Cambridge: Harvard University Press, 1972).

## PENNSYLVANIA HISTORY

11. *Chambersburg Public Opinion*, February 17, 1961.
12. B. Franklin Royer, "Biographical Sketch of B. Franklin Royer," 1959, 3, Franklin County Historical Society, Chambersburg, PA.
13. Ibid.
14. James A. Poupard, *A History of Microbiology in Philadelphia: 1880 to 2012, Including a Detailed History of the Eastern Pennsylvania Branch of the American Society for Microbiology from 1920 to 2010* (Bloomington, IN: Xlibris, 2010), 49.
15. Royer, "Biographical Sketch of B. Franklin Royer," 3.
16. *Philadelphia Inquirer*, October 12, 1918.
17. Fredrick P. Henry, *Founder's Week Memorial Volume* (Philadelphia: P. A. Davis Company, 1909), 542-44.
18. Poupard, *History of Microbiology in Philadelphia*, 43.
19. "Discussion of Diphtheria" in *Transactions on the Disease of Children of the American Medical Association* (Chicago: American Medical Association, 1898), 60.
20. Frederick P. Henry, *Founders' Week Memorial Volume*, 558.
21. Gretchen A. Condran, "The Elusive Role of Scientific Medicine in Mortality Decline: Diphtheria in Nineteenth- and Early Twentieth-Century Philadelphia," *Journal of the History of Medicine and Allied Sciences* 63, no. 4 (October 2008): 501.
22. B. Franklin Royer, "The Antitoxin Treatment of Diphtheria, with a Plea for rational Dosage in Treatment and Immunizing," *Therapeutic Gazette* 29, no. 4 (April 1905): 217-27.
23. Ibid., 224, 226.
24. First Annual Message of John E. Reyburn, Mayor of the City of Philadelphia, *Annual Reports for the Year Ending December 31, 1907*, 40-41.
25. B. Franklin Royer and E. Burvill-Holmes, "Fifteen Cases of Anthrax Treated in the Philadelphia Municipal Hospital, with Abstracts of Histories, Laboratory Notes, and Autopsy Notes, and Comments on Treatments, Including Antianthrax Serum," *Therapeutic Gazette* 24, no. 1 (January 1908): 9.
26. Franklin Royer, "A Study of Phagocytosis in Diphtheria," *Journal of Medical Research* 18, no. 1 (March 1908): 113.
27. Royer, "Hypersusceptibility of Man to Horse Serum," *Therapeutic Gazette* 24, no. 6 (June 1908): 383-90.
28. Fourth Annual Message of John Weaver, Mayor of the City of Philadelphia, *Annual Report for the Year Ending December 31, 1906*, 218.
29. Royer, "Hypersusceptibility of Man to Horse Serum," 388.
30. B. W. Kunkel, *Milestones of Health in Pennsylvania: A History of Public Health Work in the State* (Harrisburg: Department of Health, 1967), 60.
31. B. Franklin Royer, "Doctor Dixon's Work in Sanitary Science," *Proceedings of the Academy of Natural Sciences of Philadelphia* 70, no. 1 (January-April 1918): 133.
32. Samuel G. Dixon, *Third Annual Report of the Commissioner of Health of the Commonwealth of Pennsylvania for the Year 1908* (Harrisburg, 1909), 4.
33. College of the Physicians of Philadelphia, *Influenza Scrapbook* (compiled 1919), Library of the Physicians of Philadelphia.

## B. FRANKLIN ROYER: A HALF CENTURY IN PUBLIC HEALTH

34. Kunkel, *Milestones of Health in Pennsylvania*, 2–63.
35. Royer, "Doctor Dixon's Work in Sanitary Science," 135, 132, 138.
36. Samuel G. Dixon, "The Latest Experiment in State Medicine," address delivered before the Public Health Section of the New York Academy of Medicine, May 11, 1909, 3.
37. *Philadelphia Inquirer*, February 27, 1918.
38. B. Franklin Royer and C. A. Emerson, "Mosquito Eradication in Southeastern Pennsylvania," *American Journal of Public Health* 9, no. 5 (May 1919): 331.
39. The author's monograph on the epidemic in Pennsylvania and four of her cities is under review by a university press.
40. Pennsylvania General Assembly, *Laws of the General Assembly, Session of 1905* (Harrisburg, 1905), 314.
41. Alfred W. Crosby Jr., *Epidemic and Peace, 1918: America's Deadliest Influenza Epidemic* (Westport, CT: Greenwood Press, 1976), 74; and John M. Barry, *The Great Influenza: The Epic Story of the Deadliest Plague in History* (New York: Viking, 2004), 221.
42. *Allentown Morning Call*, October 8, 1918.
43. "Medical News," *JAMA* 71, no. 15 (October 1918): 1237.
44. *Philadelphia Bulletin*, October 2, 1918.
45. Howard Markel et al., "Nonpharmaceutical Interventions Implemented by US Cities during the 1918–1919 Influenza Pandemic," *Journal of the American Medical Association* 298, no. 6 (August 2007): 644–54.
46. Pennsylvania Council of National Defense, *Emergency Service of the Pennsylvania Council of National Defense in the Influenza Crisis* (Harrisburg, 1919), 12–13.
47. Barry, *The Great Influenza*, 318.
48. Royer, "Biographical Sketch of B. Franklin Royer," 6, 4.
49. John O'Hara, *The Doctor's Son*, in *Great Short Stories by John O'Hara: Stories from the Doctor's Son and Other Stories and Files on Parade* (New York: Bantam Books, 1965).
50. Pennsylvania Department of Health, *Pennsylvania's Health* (Harrisburg: Government Printer, 1932), 27.
51. Lincoln Steffens, *The Shame of the Cities* (New York: McClure, Philips and Company, 1903), 160–64, and *New York Times*, March 31, 1896.
52. *Pittsburgh Post*, October 6, 1918.
53. *Pittsburgh Post*, November 3, 1918.
54. Ibid.
55. *Pittsburgh Gazette Times*, October 17, 1918.
56. *Pittsburgh Sun*, November 4, 1918.
57. *Pittsburgh Sun*, November 2, 1918.
58. *Pittsburgh Post*, November 3, 1918.
59. *Bethlehem Globe Times*, October 3, 1918.
60. *Pittsburgh Gazette Times*, October 23, 1918.
61. Anonymous, "Dr. Royer Honored," *Pennsylvania Medical Journal* 22 (April 1919): 458.
62. B. Franklin Royer, "The Work of the Massachusetts-Halifax Health Commission," *American Journal of Public Health* 12, no. 3 (March 1922): 195.

63. When the author visited the house in June 2013, the curator revealed that in the early twenty-first century he had discovered bits of metal from the *Mont Blanc* embedded in attic beams, beams split lengthwise from the explosion.
64. Royer, "Work of the Massachusetts-Halifax Health Commission," 195.
65. B. Franklin Royer, "Health Centers of the Massachusetts-Halifax Health Commission," *Journal of the American Medical Association* 79, no. 16 (October 1922): 1310.
66. B. Franklin Royer, "Post-War Health Programme, Halifax, Nova Scotia: International Amity Exemplified," *Canadian Medical Association Journal* 13, no. 5 (May 1923): 351, 350.
67. B. Franklin Royer, "Combating Venereal Diseases" *Canadian Nurse and Hospital Review* 16, no. 6 (June 1920): 332, 331.
68. *Ibid.*, 333.
69. J. Layton Ralston, "International Goodwill," *Proceedings: Thirteenth Annual Convention of Rotary International* (Chicago: Rotary International, June 5–9, 1922), 271.
70. Massachusetts-Halifax Health Commission, *Report of the Massachusetts-Halifax Health Commission* (Halifax, NS, 1925), 32–33.
71. Royer, "Work of the Massachusetts-Halifax Health Commission," 200.
72. Royer, "Post-War Health Programme, Halifax, Nova Scotia," 350, 352.
73. Massachusetts-Halifax Health Commission, *Report of the Massachusetts-Halifax Health Commission*, 24, 11.
74. B. Franklin Royer, "Utilize Light in Conserving the Vision of School Children," *Journal of School Health* 1, no. 12 (May 1931): 18–19.
75. B. Franklin Royer, "Prevention of Blindness Responsibilities of Official and Volunteer Agencies," in *Proceedings of the 1935 Annual Conference of the National Society for the Prevention of Blindness* (New York: NSPB, 1935), 68.
76. B. Franklin Royer, "Need of Epidemiological Research in Trachoma," *American Journal of Public Health* 16, no. 7 (July 1926): 706–9.
77. B. Franklin Royer, "The Relation of Venereal Diseases to Vision Defects," *Journal of Social Hygiene* 13, no. 7 (October 1927): 385–93.
78. B. Franklin Royer, "Syphilis and Gonorrhea as Causes of Blindness," *Journal of Social Hygiene* 17, no. 3 (March 1931): 151–57.
79. C. A. Smith, M.D., and Laura Halse, M.S., "Ophthalmia Neonatorum: A History of Efforts to Control Gonorrheal Infection in the Eyes of the Newborn Child," *Public Health Reports* 70, no. 5 (May 1955): 465.
80. Anne Geddes, "Who Are The People Receiving Aid to the Blind and How Much Assistance Are They Receiving?," paper given at the National Conference of Social Work, May 1940, 18
81. Royer, "Biographical Sketch of B. Franklin Royer," 9.
82. *Ibid.*