

Iowa's History of Public Health • Fighting Deadly Diseases • Save the Babies • The Polio Scare

Summer 2005 • \$6

Iowa Heritage

ILLUSTRATED



Front Porch

Dear Readers,

I stared gloomily, guiltily, at the bulletin board display of cheery yellow dental cards in my fourth-grade classroom. My dental card wasn't up there because I hadn't yet "visited the dentist" (as if it were a social call?). His signature on my card would prove I'd gotten my yearly dental exam. I dreaded those exams because I usually had lots of cavities; perhaps our well water lacked sufficient fluoride?

Scattered throughout our personal lives is evidence of the history and impact of public health, the subject of this issue.

Remember getting the polio vaccine? I do. I didn't know why I was standing in line in our school gymnasium, but how fortunate my classmates and I were to get the vaccine.

On other school days, I was relieved to go to the cool, quiet office of the school nurse to recover from a scraped knee or upset stomach. Not all schools in the 1950s had school nurses, though public health workers pushed for them.

Once I thought about it, more and more public health issues occurred to me. On our farm, there was the day my older brother climbed on the tractor and dramatically pulled over the old outhouse. It had sat up on a hill at the top of our lawn—uphill from our well—probably for decades. Our farmhouse had indoor plumbing but for some reason the outhouse remained. Now its days were over. My brother hauled off the wood, filled the pit with dirt, and I planted petunias there.

Our monthly 4-H meetings always began with roll call. We each answered with our "health score," a number I hurriedly calculated on the way to the meeting. Points were gained for exercise, nutrition, good grooming, and, oddly, for not drinking tea or coffee. I could always count that point—I'd never had either, and my mom said coffee or tea would stunt my growth. Because my classmates were all sprouting up past me, I couldn't afford stunted growth! But I didn't totally believe my mom. This spring I found a more satisfying

answer to the tea and coffee issue in historian Dorothy Schwieder's book *75 Years of Service: Cooperative Extension in Iowa*. Schwieder relates how extension workers as early as the 1920s worked hard to encourage children to drink more milk instead of other fluids. A home demonstration agent in Scott County bemoaned that she had come across a seven-year-old girl who, instead of drinking nutritious milk, was "drinking six cups of coffee daily."

My mother fought her own battles against disease. She canned vegetables and fruits, and after the jars were filled, we'd sit quietly and listen for the "pop" as each jar lid sealed, creating the telltale dimple. I didn't understand that bacteria could get into canned food in jars that hadn't seal properly, but my mother knew. Anything that hadn't sealed was refrigerated and served that night.

Less successful than Mom's canning was the enormous family picnic my family hosted one summer afternoon. For days, we had pulled weeds, scrubbed the front porch, trimmed the hedge, spruced up the yard. By noon, card tables dotted the just-mown lawn. Soon relatives arrived with potato salad, fried chicken, and cherry pies. The flies arrived too. Someone quipped, "Who invited them?" I don't know why we hadn't anticipated the hordes of flies that descended on the food. After all, flies were an accepted nuisance in the barnyard and hoghouse.

When my uncle accidentally swallowed a fly along with his cherry pie, my mortified mother shooed all the aunts into the house. The men just laughed and had another beer. We kids moved too fast for the flies to settle on us.

Later, it became a family joke, but far earlier in the century public health workers were deadly serious about flies carrying deadly diseases.

Vaccinating against polio, drinking milk, vanquishing flies. Many things we take for granted are the result of hard-won battles. Over the decades, public health workers have fought these battles with professionalism and passion.

The articles in this issue are brief, but the accomplishments of public health are enormous, and worthy of our greatest respect.

—Ginalie Swaim, editor

Iowa Heritage Illustrated

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This magazine is a benefit to members of the State Historical Society of Iowa. One-year membership of \$50 includes additional benefits. Contact Sarah McKiness (515-281-6911), Sarah.McKiness@iowa.gov, State Historical Society of Iowa, 600 East Locust, Des Moines, Iowa 50319.

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Iowa Heritage Illustrated (ISSN 1088-5943) is published quarterly by the State Historical Society of Iowa, a division of the Department of Cultural Affairs, State of Iowa. © 2005 State Historical Society of Iowa. The State Historical Society of Iowa and the editor are not responsible for contributors' statements of opinion. Printed with soy-based ink on recycled paper.

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Periodical postage paid at Iowa City, IA. Postmaster: Send address changes to State Historical Society of Iowa, 402 Iowa Ave., Iowa City, IA 52240-1806.

Iowa Heritage

ILLUSTRATED

Formerly The Palimpsest

Summer 2005, Vol. 86, No. 2

- 50 **Salubrious or Unsanitary Iowa? The Struggle for the Public's Health**
by Ginalie Swaim
- 54 **Instructing the Masses: The Development of Iowa's Health Department**
by Ronald D. Eckoff
- 57 **Iowa Physicians Ponder the Germ Theory**
by Matt Schaefer
- 59 **Deadly Diphtheria and Walter Bierring**
by Susan C. Lawrence
- 61 **Battling Smallpox: State and Local Boards of Health**
by Philip L. Frana
- 67 **Lorenzo Coffin and Railroad Safety**
by Tim Lane
- 69 **Tracking Down Disease: The University of Iowa Hygienic Laboratory**
by Kathy Fait
- 72 **Tuberculosis: The White Plague in Iowa**
by Ginalie Swaim
- 74 **Healthy Homes: Mothers, Children, and Nurses**
by Ginalie Swaim
- 78 **War Opens Up VD Discussion**
by Ginalie Swaim
- 79 **The Core of Public Health: Vital Records and Statistics**
by Ronald D. Eckoff
- 80 **People and Pigs: Iowa's Role in 20th-Century Influenza History**
by Russell W. Carrier
- 86 **Nothing Much You Can Do: Polio in Iowa**
by Ginalie Swaim
- 89 **Fluoridation in Iowa**
by William C. Maurer
- 91 **The Evolving Case against Smoking: Lapse of Morals to Hazard to Health**
by Ronald D. Eckoff
- 92 **Saint Patterson and his Duck Soup**
by Tim Lane
- 94 **Iowa: A Place to Grow ... Healthy**
by Tim Lane
- 95 **Public Health in the Past 30 Years**
by Louise Lex
- 96 **Ten Public Health Achievements, 1900–1999**

On the Cover

Red Cross volunteers Mrs. William Harold Sears and Mrs. Randall Klein capture the attention of young Billy Archer at Des Moines's Roadside Settlement center, February 1945. Iowa's history of public health fills this issue.



Salubrious or Unsanitary Iowa?

The Struggle for the Public's Health

by Ginalie Swaim

A few days before Christmas, 1865, the *Iowa State Register* in Des Moines described a tragic scene: "Two nights ago, as we are informed by Mr. Abel, two girls, one ten years of age, and the other four, were lying dead at the residence of their father, Mr. Barlew, two or three miles east of town. They had died of diphtheria. At the same time a son, another daughter, and a sister of Mr. B. were prostrated by the same disease."

Of eastern Iowa in the 1840s, an early resident remembered: "We just shook, and shook, and shook, with the ague. We could only eat when the chill was on us, being too sick when the fever was on. I well remember how the cup would rattle against my teeth when I tried to drink. . . . Almost everybody in that thinly settled part of Iowa would have the ague part of the time. . . . I can still see how thin and pale and woe-be-gone everyone looked."

Iowans in the Des Moines River valley in 1874 were no less vulnerable: "When one of a family became sick [with cholera], another and another would be attacked, till often whole families in a few hours would be taken away. Neighborhoods would be alarmed and many left their homes, and frequently it was difficult to get any one to take care of the sick, or bury the dead."

Although immigrant guides and local editors rhapsodized about Iowa's salubrious climate and its citizens' glowing health, there was plenty of disease and poor health. Early newspapers reprinted sensational news of outbreaks of disease from other cities or states, but sometimes they were more cautious in reporting local outbreaks, fearing its negative impact on attracting new businesses and residents, and thus on the local economy. The *Indianola Herald* in 1875, for example, quashed rumors of smallpox in town. "Appearing just at a time when immigration is pouring into our county, the

amount of damage it will do is almost incalculable [with the story being reprinted in] papers all over the country." Certainly there must have been a feeling of panic among the citizenry over such rumors or reports, for Iowa physicians had few if any tools with which to battle malaria ("ague"), cholera, diphtheria, typhoid fever, or any of the other prevalent diseases.

The mid-19th-century understanding of disease was that it was caused by miasmas, or vapors, emanating from filth, rotting vegetation, stagnant water, sewage, and damp soil. "The low grounds on the south and west of the city seem to be the favorite locations for the deposition of garbage and street cleanings," complained Des Moines's *Iowa State Register* in the summer of 1875. "These, in the heat and rains, undergo slow decomposition, and send off poison, its emanations during the whole summer to be carried by the prevailing winds over the whole city. These evils can be remedied and a considerable sickness prevented." Even breaking the prairie created miasmas, according to an Iowa doctor in 1867, who believed that as the thick, rotting sod decomposed in the summer, "a malarious emanation" evolved.

In 1885 the president of Keokuk's board of health counted 65 filthy alleys, 25 privies, 3 stables, 12 hog pens, and 2 chicken coops that needed to be abated, as well as a "green pond, emanating obnoxious gases of a dangerous character, endangering the health, not only of the neighborhood, but of the whole city." He ordered that debris be burned and "dirty and damp cellars be cleaned, ventilated and disinfected."

Ridding towns and cities of filth and decay was the goal of the great sanitary movement. Focused on the poor and overcrowded slums of large American and European cities, sanitarians first blamed the "ignorant and filthy" poor and immigrant populations for squalor that caused disease. But as cities built public sewage systems, and wealthy households installed water closets (indoor toilets), sanitarians claimed that sewer pipes and traps in upper-class homes also emanated dangerous vapors. These homes were just as likely to be the source of deadly diseases. Diagrams of correct household plumbing be-

An Eldora woman poses with her weapons against dirt and disease: the broom, the dustpan, the bucket, and a well full of water. Circa 1900.

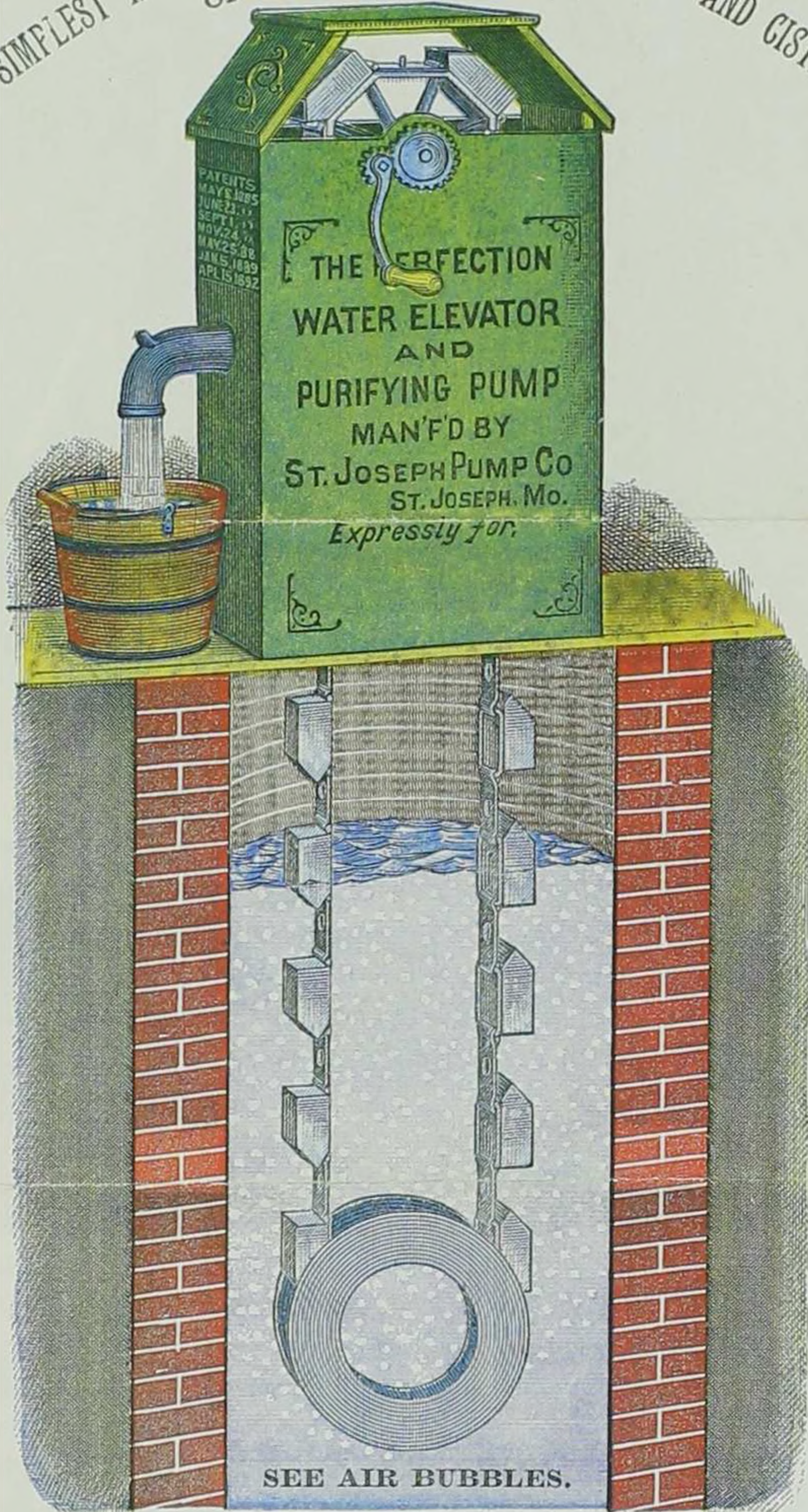
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Cholera and Typhoid
Fever Preventive

Scarlet and Malaria
Fever Preventive

THE SIMPLEST AND MOST DURABLE PUMP FOR WELLS AND CISTERNS
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Our New Double Geared Fixture for 1892-3 Guaranteed.



Already Demonstrated to be a Ready Seller. Send in Your Orders Early.

SEE AIR BUBBLES.

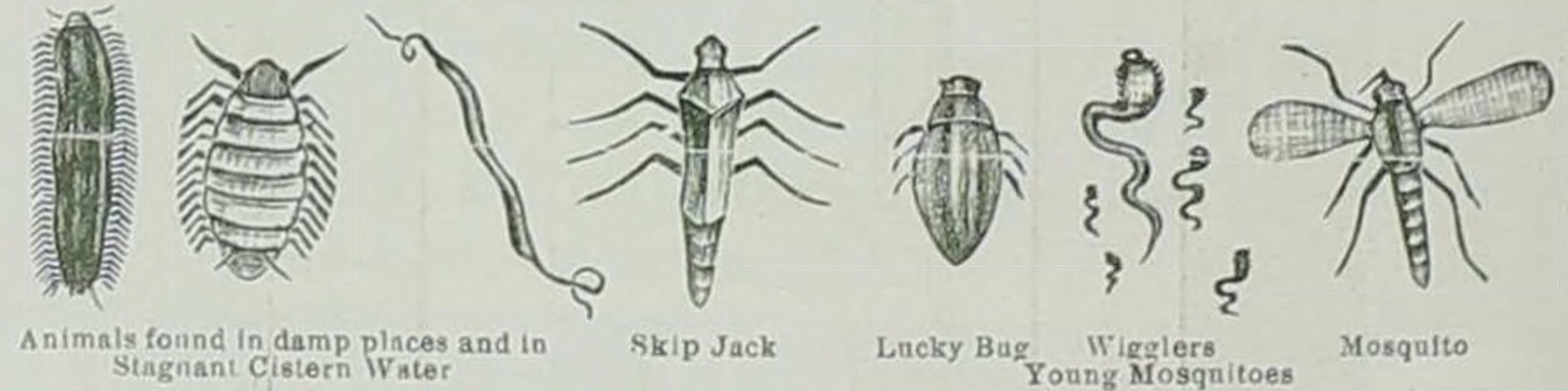
HOW DOES IT PURIFY WATER?

Every bucket descends full of air and ascends full of water. For every gallon of water drawn a gallon of air (the vital element) is circulated through the water, from the bottom to the top. This not only thoroughly agitates, ventilates and purifies the water, but it forces a large surplus of oxygen from the air into the water, and this surplus of oxygen is sufficient to consume all impurities or organic matter in the foulest water. It is an admitted fact by thousands using them, that this purifier is the only pump invented that will destroy wiggles, water bugs, water lice, and make foul or stagnant well or cistern water pure and sweet, removing all color, bad taste and smell. After a few days' use the old flatness and insipidity is replaced by a sparkle like that of a mountain spring. In short, it will make Bad Water Good and Good Water Better.

OVER

In the wake of the groundbreaking germ theory came new consumer products promising the ability to kill germs. Here, an 1890s advertisement claims that this pump for wells and cisterns prevents cholera, typhoid fever, scarlet fever, and malaria, all caused by "animalculae and bacteria." "Water never becomes a harbor of such foul animal life when the vital element, OXYGEN, is given, and circulated through by the use of the 'Perfection' Purifying Pump."

"Perfections" sold in the city of Cincinnati alone last season. Many cities use it exclusively.



The above cuts illustrate the kind of animalculae and bacteria that is contained in impure water. Water containing such animal life drank into the system is the cause of more diseases than all others combined. Water never becomes a harbor of such foul animal life when the vital element, OXYGEN, is given, and circulated through by the use of the "Perfection" Purifying Pump.

FOR SALE BY

OVER

gan to appear in pattern books for housebuilders and even in women's magazines. In a long article on the importance of effective sewage systems, the *Iowa State Register* in 1877 warned that when sewer gas enters the home, "it speedily makes its presence known by an outbreak of fever of typhoidal nature. Unfortunately, this gas, which is of very deleterious character, is not strongly perceptible to the sense of smell" and can only be detected by "a certain 'closeness' and heavy feeling in the house. . . . Sickness immediately follows."

SHSI (IOWA CITY)

CHOLERA CHOLERA

terrible disease now WITHIN OUR BORDER, the "PERFECTION WATER ELEVATOR AND PURIFYING PUMP" is the best constructed and most durable BUCKET PUMP that has ever triumphed over all competition, will rise and declare itself the CONQUERER OF CHOLERA. And from this time on, every FAMILY SHOULD BE WITHOUT THE "PERFECTION WATER ELEVATOR AND PURIFYING PUMP" or cistern.

RECOMMENDED BY ALL SCIENTISTS AND THE MEDICAL BOARD as the best Water Purifier of the Age, and a preventive of TYPHOID, SCARLET and MALARIAL fevers. On the whole world, and as evidence of the intrinsic merits of this pump, it is featured under our late patents, we can with pride recommend it to all who handle pumps in car lots. See their catalogues.

The Human System Consists of.

A Physician and Surgeon of London, recently analyzed the body of a man of average class in Chemistry. The body operated upon weighed 154.4 pounds and upon the platform 23.1 pounds of Carbon, 2.2 pounds of Oxygen, and about one ounce each of Sodium, Iron, Potassium, Magnesium, and Phosphorus. His solid residue, Dr. Lancaster estimated that there were 5,595 grains of Nitrogen, 121 pounds, 105,900 cubic feet of Hydrogen, weighing 15.4 pounds, combined in the following: 121 pounds of Water, 5 pounds of Phosphorus, 5 pounds of Fibrin and Albumen, and 7.7 pounds Phosphate of Lime. All Scientific Writers, Health Boards and the Medical World agree that we get our Oxygen, Nitrogen and Hydrogen from the atmosphere. Breathe Pure Air, DRINK PURE WATER AND BATHE IN PURE WATER. For these reasons that CHOLERA is taken into the system through the lungs, inhaled and absorbed when Bathing. The Health and Health Boards is to guard against contagious diseases in life, and from the very fact that impure drinking water is the cause of Cholera and other zymotic diseases than all others, we earnestly endorse the "PERFECTION PURIFYING PUMP." Use it in your well or cistern, and the water contained therein will be as pure as a mountain stream.

PERFECTION PURIFYING PUMPS ARE NOW IN GENERAL USE THROUGHOUT THE UNITED STATES AND FOREIGN COUNTRIES. 2,500

Historian Maureen Ogle writes that "systematic sewer building was spurred by prevailing notions of contagious diseases in the mid-nineteenth century. Disease did not distinguish rich from poor. The six cholera epidemics that swept North America between 1832 and 1873 showed the deadly strength of contagion. While mid-century physicians did not understand that underlying viruses or bacteria were responsible . . . they were convinced that disease was caused by bad air."

By the 1880s, the miasma theory began to lose its hold as European scientists identified specific germs as the cause of certain diseases. The new State Board of Health in Iowa worked hard to dispel the perception that miasmas from decay and filth caused disease. "What the older observers were wont to call causes were conditions only," the board emphasized in 1893. "Overcrowding or density of population, faulty ventilation, and the presence of filth, are simply the favorable and unfavorable conditions in the propagation of disease, and not in any sense its causes." Although sanitation remained a weapon against disease, health workers now turned to contagion control, knowing that diseases could be passed from one to another—sometimes even by a healthy, asymptomatic carrier. Quarantines, vaccines, antitoxins, and other preventive measures were the new arsenal in the battle against disease.

Public health had long been in the hands of professionals—social reformers, health officials, physicians, and local authorities. The individual citizen was the recipient of their work. But it wasn't long before the American homemaker became an agent of change in disease control and health reform. To the extent that she believed in these changes, and as best as she could, she incorporated new information about nutrition, child-rearing, housekeeping, and cleanliness (not easy for farm women who were still lugging water into their homes from outside wells). She harped at her children to keep the flies out, wash their hands, cover their mouths when they sneezed or coughed.

Women also had consumer clout; playing on their concern for healthy families, manufacturers and adver-

tisers created a delicate balance between what was hygienic and what was hype. New words appeared in advertisements: sanitary, pure, disinfects, germ-fighting. The scent of fresh pine was added to cleansers. Packaged food and cellophane-wrapped bakery goods replaced uncovered, open-air displays of groceries. Vacuums promised to suck up dirt and germs, filters would shut them out. Anything with cracks and crevices, where dirt and germs could lurk, were culprits of disease. Linoleum covered wooden floors. Victorian dust-catching draperies, knick-knacks and elaborate woodwork gave way to simpler decor. The carved walnut bed was packed off to the attic; a more "sanitary" metal bed took its place. Magazines assured women that kitchens and bathrooms with smooth, nonporous, white surfaces were easier to clean. Dishes must sparkle. So must teeth. Germs could lessen one's beauty and sexual attraction, too, so pharmacies stocked special soaps, deodorants, and mouthwashes for the somewhat paranoid consumer, who now shouldered a new set of social expectations. Meanwhile, unbeknownst to most Americans focused on their daily lives, public health workers were facing off against new threats to the nation's health, the focus of the following articles.

This issue is a collaboration of the Iowa Department of Public Health and *Iowa Heritage Illustrated* magazine. It traces the history of public health in Iowa—something we ordinary citizens seldom think about, because public health has vanquished or diminished so many of the diseases that once menaced Iowans. But as in any drama—and saving lives is dramatic—there's always a new enemy around the corner.

This is also a story of institutions and individuals whose work has built upon each other's, overlapping and intertwining for more than 125 years. The story also extends well beyond our state. Iowans outside of our borders have done important work for a healthier world, and today's global community brings stubborn new diseases to Iowa's doorstep. ❖

Acknowledgments: This issue is the result of many skilled individuals devoted to their work. At the Iowa Department of Public Health: Tim Lane and Louise Lex, and three retired personnel, Russell W. Currier, Ronald D. Eckoff, and William C. Maurer. At the University of Iowa Hygienic Laboratory: Kathy Fait and Jack Cameron. At the University of Iowa: Susan Lawrence (History Department), Janet Weaver (Iowa Women's Archives), and David McCartney (University Archives). At the Herbert Hoover Presidential Library: archivist Matt Schaefer. At the State Historical Society of Iowa: Sharon Avery, Marvin Bergman, Linda Brown, Kevin Burford, Becki Plunkett, and John Zeller. As editor, I thank you all. —Ginalie Swaim

Instructing the Masses

The Development of Iowa's Health Department

by Ronald D. Eckoff

One hundred and twenty-five years ago, the State Board of Health was created. The board comprised seven physicians, one engineer, and the attorney general. A "secretary" (the director) was chosen by the board. The legislature appropriated \$5,000 to the board (about \$100,000 in today's dollars).

Iowa law in 1867 had placed local health responsibilities on city, town, and township boards of health, as had many states. But as U.S. immigration and nationwide transportation grew, so did the spread of diseases, calling for coordination within states and regions, hence state boards of health.

William S. Robertson, State University of Iowa medical department professor and the state senator responsible for the law creating the State Board of Health, was the board's first president. His vision was far ranging: "by wise and timely suggestions" the board would "mold popular opinion and . . . instruct the masses in the elements of sanitary science that all may recognize the wisdom in the enactment of the health law which shall give them purer water, better drainage, better ventilated homes, more healthy food, and longer life."

For its first five years, the state board's role was largely informational and advisory, limited to reporting outbreaks of contagious disease and trying to compile records of births and deaths. Its biennial reports and health bulletins functioned as conduits of questions and answers between local doctors, the state board, and other experts—questions such as how to disinfect a schoolhouse after diphtheria; where to locate a pest house to isolate smallpox patients; how to choose the best kind of earth closets as indoor toilets.

Doctors' frustration was often evident. In 1882, for example, a Sioux Center doctor complained that in Orange City, smallpox vaccination "is absolutely refused, many of the Hollanders, if not nearly all, being fatalists, and claiming that if they are destined to have small-pox they will have it, whether precautions are taken or not." A Fort Dodge physician was uneasy about the water supply, taken from the Des Moines River "a few feet below the mouth of Soldier creek . . . [which

was] the only sewer of the north third of our city." Upstream were "filthy hog and cattle yards," a brewery, and two cemeteries on its banks. In Sidney, a Fremont County doctor described the most prevalent diseases as "malorious . . . largely caused by immense river bottoms of the Nishnabotna and Missouri rivers." There, he observed, "we have more frequent cases of severe congestion, intermittent and remittent fevers."

One doctor who had inspected dozens of homes despaired over one with "seven children, four dogs, a sick cat, a pile of rotten potatoes, a pile of bones, and a lame goose, and the only means of admitting fresh air was through bullet holes in the door."

Historian Lee Anderson writes that "as a pulpit for dissemination of the gospel of scientific medicine, the board of health was both cause and effect of an extraordinary expansion of the state's role in the broad area of public health in the 1880s and 1890s." The board gained greater regulatory power over quarantines, disinfection, and other contagious disease controls. A state veterinarian was added to the board, and a bacteriologist and chemist designated. Iowa passed laws regulating pharmacy, dentistry, and medical practice. Still, the board ended the century with the same yearly allocation (\$5,000) since its founding in 1880, despite rapid increases in the state's population and the board's responsibilities.

As the new century began, the State Board of Health launched public campaigns to vaccinate against smallpox, diphtheria, and typhoid fever. It distributed diphtheria antitoxin to the underprivileged and to others at low cost through 300 statewide stations. The board directed a watchful eye over towns and cities as they developed new public water and sewage systems and plumbing codes, and it began surveys of creeks, rivers, and lakes for pollution.

World War I forced the nation, and the State Board of Health, to focus on venereal disease. In the war's aftermath, the board finally won support for mandating reporting of vital records. But there was no dearth of demands on the board in the 1920s. It recommended

HOW DISEASES ARE SPREAD BY THE COMMON DRINKING CUP

The Iowa State Board of Health by resolution has condemned the common drinking cup, and has forbidden its use in all public places such as parks, streets, schoolhouses, hotels, factories, workshops, libraries, railway stations and cars and all other public places, and was in effect January 1, 1912. Examine the following:

Prevention Better than Cure

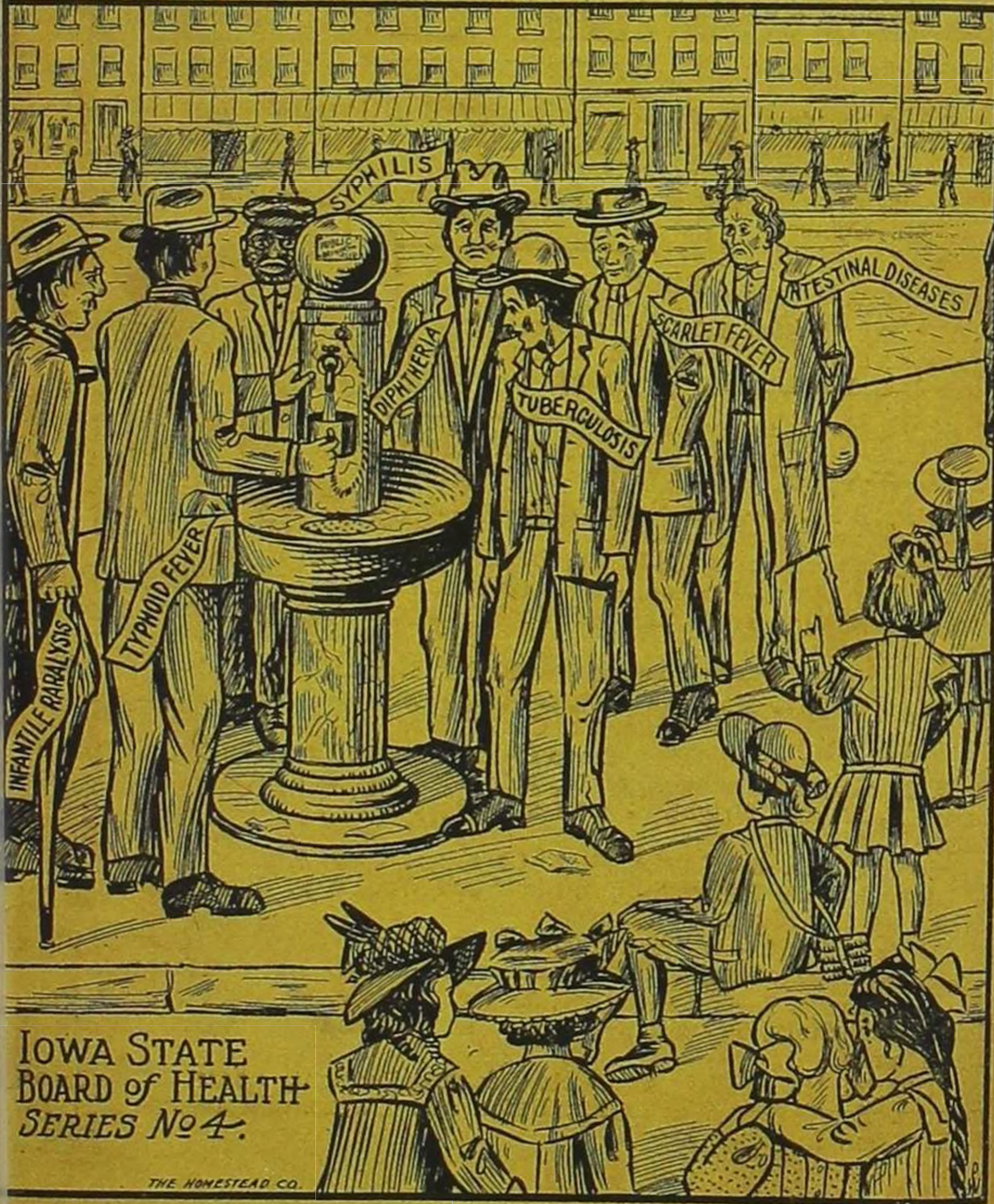


Fig. 5.—Illustrating evils of common drinking cups.

As of 1912, the State Board of Health forbade the “common drinking cup” in all public places: “parks, streets, schoolhouses, hotels, factories, workshops, libraries, railway stations and cars,” to help prevent communicable diseases. Below: The 1912 health bulletin suggested that privies be distant from houses and wells, to avoid water contamination and control flies.

closing a loophole in hotel inspections so that a room infested with bed bugs and vermin be closed to the public until it was “free of night terrors.” Far more serious, a new infectious disease from cattle (undulant fever, or brucellosis) was discovered in a packinghouse worker in Mason City; more cases soon appeared across the state. The bewildering array of small, local health departments needed to be changed to larger, more efficient county units. Stronger housing statutes were needed for coal miners and road-grading crews living in camps; college students renting poorly ventilated attics with inadequate fire protection and toilet facilities;

and Mexican “or other foreign labor” sheltered in boxcars along railroad right-of-ways, with little or no ventilation and unsanitary surroundings.

In 1924, state government consolidated the Board of Health and other government functions (hotel inspection, and the boards of examiners for medicine, dentistry, embalming, nursing, osteopathy, optometry, chiropractic, and podiatry). The new agency was the Iowa Department of Health, but its financial woes were not new. Care of the sick and prevention of disease was “on a lower plane in Iowa than in any other state in the Union,” the health commissioner complained a few years later—two cents per capita compared to an average of nine cents.

The Great Depression had a substantial impact on public health in Iowa. Budgets were severely cut. New federal funds, however, helped support many activities. Social Security Act funds added new positions: an engineer for rural sanitation programs, a milk sanitarian, three graduate engineers, a vital records statistician, a stenographer, and more staff in epidemiology, obstetrics, pediatrics, and dentistry, as well as advanced training of nurses, doctors, and engineers, often leading to a master of public health degree.

The health department was routinely inspecting

BOTH IMAGES: SHSI (IOWA CITY)

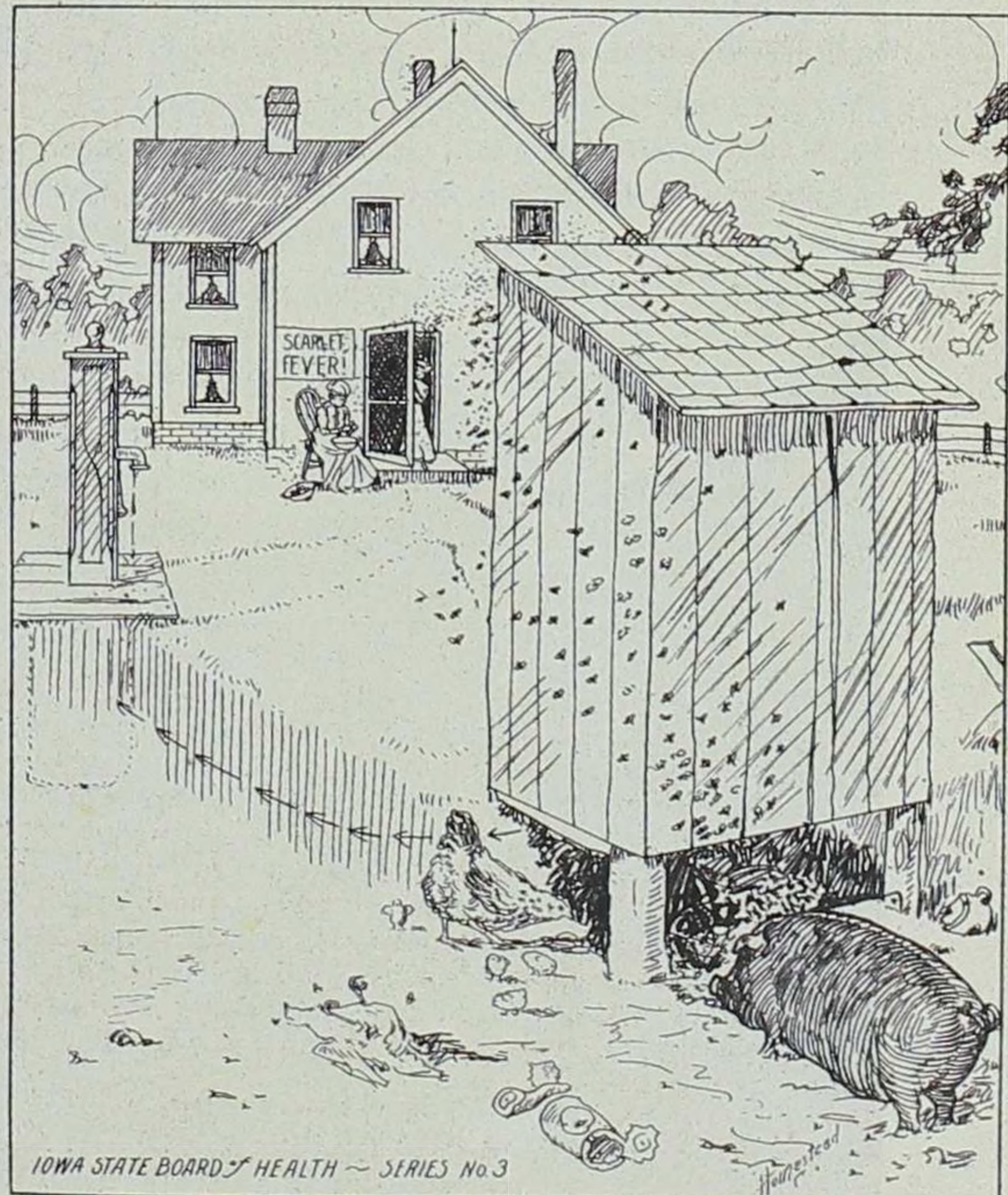
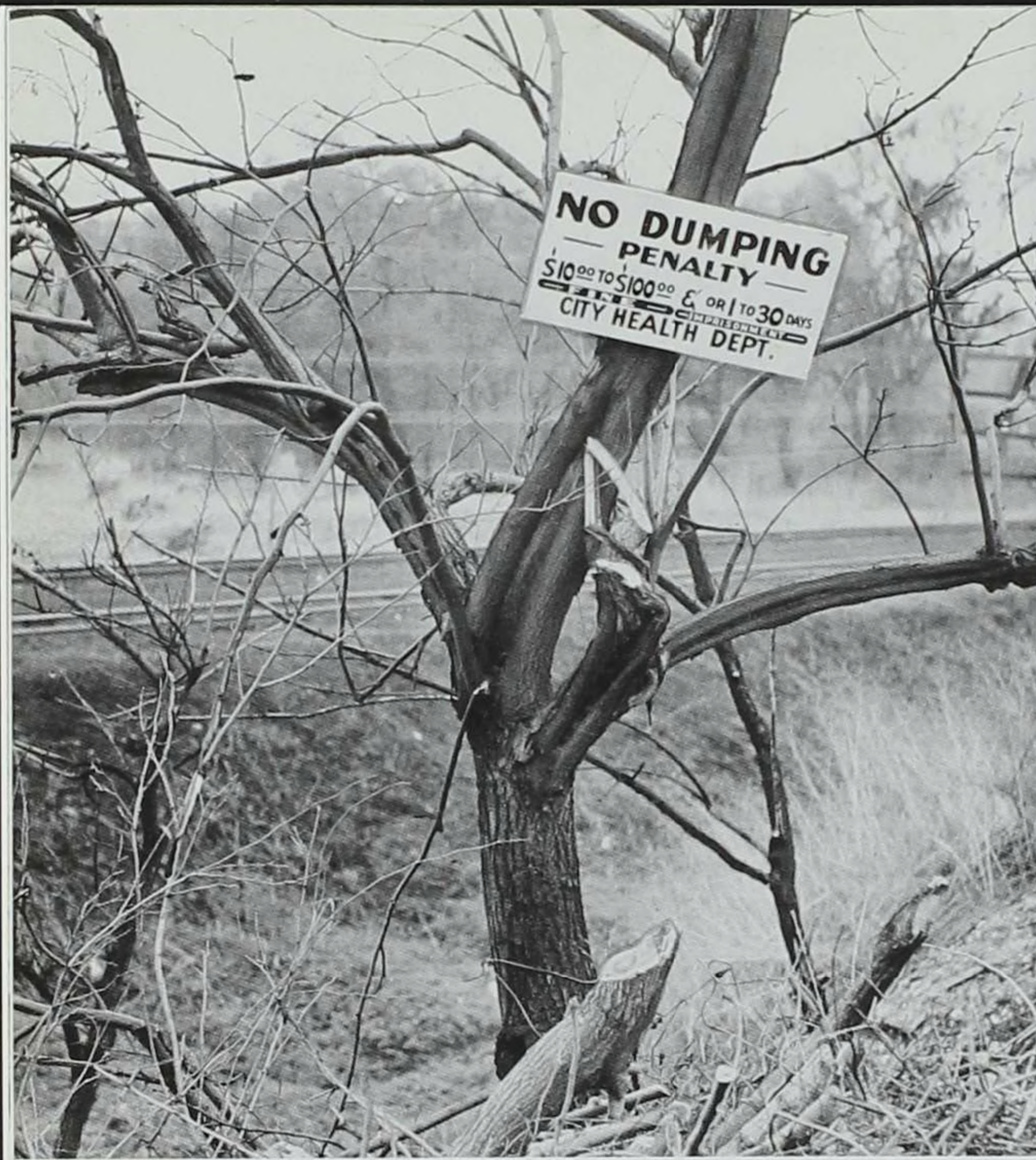


FIG. 4.—The insanitary privy with the well not far away.



Controlling waste disposal was another responsibility of health departments (Des Moines, 1940). Below: Ramshackle dwellings with primitive plumbing in Des Moines, 1937.

BOTH PHOTOS: SHSI (DES MOINES) DES MOINES REGISTER AND TRIBUNE

water quality by the 1930s. Water supplies in tourist camps concerned the department, but they were pleased that the WPA was building nearly 1,000 new sanitary privies for schools and homes. "Industrial hygiene" focused on ventilation and air purity in factories and the strain on workers' eyes, ears, nerves, and repetitive use of muscles. Good health was especially important for those working in munitions plants for the war effort.

There was no let-up in challenges and responsibilities in the following decades: new diseases that "jumped species," pollution, polio, the fight for fluoridation, and the push for public health nurses.

Now celebrating its 125-year anniversary, the Iowa Department of Public Health has seen massive expansion of its responsibilities and its effect on Iowans' health. ❖

Ronald D. Eckoff retired in 2002 after 36 years at the Iowa Department of Public Health. He served as a division director, division medical director, and twice as acting department director. He is preparing a history of the Iowa State Board of Health/Iowa Department of Public Health and local public health in Iowa. Anyone with information or suggestions may contact him at Ronald D. Eckoff, 12534 SW Maffitt Lake Drive, Cumming, Iowa 50061, or by e-mail: reckoff@radiks.net.



Iowa Physicians Ponder the Germ Theory

by Matt Schaefer

William Robertson's lecture on Asiatic cholera was a yearly event at the State University of Iowa's Department of Medicine. Cholera was one of the most feared epidemic diseases in 19th-century America, appearing periodically with devastating results. As professor of theory and practice of medicine, Robertson was duty bound to train Iowa's physicians how to recognize cholera, and how to minimize its impact.

Then in 1883, for the first time in a dozen years, Robertson did not present his routine lecture on Asiatic cholera. Research in Europe was leading to a new theory of its cause. German scientist Robert Koch, after a year of painstaking research, had isolated the specific bacillus, comma vibrio, that caused cholera.

This bacillus was just one of a number of specific organisms isolated and identified during the 1880s. European microbe hunters Pasteur, Koch, Roux, and Lister identified specific germs as the causes of anthrax, rabies, cholera, tuberculosis, diphtheria, and typhoid fever. This new theory—that germs caused disease—was a turning point in medical understanding. The theory emerged out of increasingly rigorous laboratory science, the new field of "bacteriology," and improved microscopy. The germ theory gave doctors a better way to understand vectors of disease causation, and with this understanding, they hoped to offer better diagnosis and better treatment.

Koch's isolation of the cholera bacillus was widely publicized in Europe and the United States in the summer of 1883. At the State University of Iowa, Robertson was clearly impressed, both by Koch's reputation and by the quality of his new research. Robertson immediately revised his cholera lecture to incorporate these new findings. He rewrote entirely the section on cholera's cause, presenting 22 pages of new material to his class lecture in 1884. This new material is a powerful illustration of the international sweep of the germ theory.

First Robertson laid out the old model of cholera causation: "This power of contagion resides in the discharges of individuals infected with cholera and the agent of transmission is generally the drinking water." Although doctors had known for a generation that contaminated water was a vector for cholera, Koch had identified the specific agent in the water, the germ, that caused the disease. Koch's genius, Robertson said, was in "isolating from the numerous species of bacterial life that infest the intestinal canal, the one characteristic and constant form" that always appeared in Asiatic cholera. For Robertson, this was sufficient proof.

Then he went one step further, describing in detail the comma-shaped bacillus that caused cholera and analyzing Koch's methodology. This was unusual, for at the time, the university's medical department had no course in bacteriology, and the microscope was not yet a common teaching tool. The students would have to take it on faith that Robertson and Koch were right.

Other Iowa physicians, reading the same medical articles as Robertson, were not so willing to accept this germ as the specific cause of cholera. Many lacked microscopes, so they could not even see the germs. At the 1884 meeting of the Iowa State Medical Society, R. J. Farquharson (then secretary of the State Board of Health) disparaged Koch: he had "failed entirely to [transmit] the disease, either by inoculation, injection or ingestion." In fact, Farquharson added, other physicians had drunk beakers full of the cholera vibrio without ill effect. He concluded: "The manner in which cholera is conveyed is not certainly known."

Other members of the Iowa State Medical Society also split on the issue of the germ theory. No clear consensus was reached in the mid-1880s. As Des Moines physician George Jenkinson put it: "For each doctor almost ready to accept the bacterian theory as the most reasonable explanation of the etiology of all epidemic, contagious and pestilential disease," there was another

physician avowing that specific causes "still elude our search, hidden by the matrix of the future."

Even Robertson, avid advocate of the germ theory, had initially reserved judgment on Koch's assertion in 1882 that a specific germ caused another deadly disease—tuberculosis. Tuberculosis was one of the most feared diseases in the 19th century, a "white plague" that cut down thousands in the prime of life. Koch had been widely hailed when he announced to the world in 1882 that he had identified the bacillus that caused tuberculosis, but Robertson did not modify his lectures on pulmonary consumption and the pathology of tuberculosis. Robertson addressed virtually all suspected causes, from hereditary predisposition, to non-specific environmental factors, to specific matter deposited in the lungs, before concluding that "there is no concrete evidence that tuberculosis was the result of a specific infectious agent."

Robertson was not alone in his skepticism. At first, many Iowa physicians questioned Koch's tuberculosis bacillus. David Fairchild, writing the 1884 report on microscopy for the Iowa State Medical Society, observed: "Much interest has been excited, during this past year, by [this] discovery. . . . [But] we are not all as yet prepared to accept Koch's bacillus theory of consumption." By 1887, Fairchild had changed his mind and began using the tuberculosis bacillus to show how pathology and the microscope had revolutionized medicine. The Iowa State Board of Health considered the case closed by 1889: "Never has there been such a rapid change in

public sentiment . . . since Koch . . . announced to the world that consumption was a communicable disease."

Nevertheless, doctors across the state came to accept the germ theory gradually, judging each disease, each germ, on a case-by-case basis, weighing their own experience and analysis of germ cultures, and considering whether knowledge of a specific cause offered any change in treating a patient. In truth, the germ theory still had limited impact on treatment. Knowing that germs caused cholera, tuberculosis, and typhoid fever provided rationales for quarantines, but medicine offered no sure-fire treatments once the diseases were manifest.

By the 1890s, debate on the germ theory was over. Scores of studies linked specific microbes to specific diseases, and the germ theory directly led to anti-toxins for diphtheria, rabies, and anthrax. Nearly all Iowa physicians embraced the theory. Walter Bierring, professor of bacteriology at the State University of Iowa's medical department, wrote in 1895 that the presence of the tubercle bacillus was "the only reliable and positive criterion of tuberculosis," essentially defining the disease via bacteriology. David Fairchild, in his presidential address to the Medical Society in 1896, concluded that the germ theory had advanced medical practice from uncertainty and provided "the working hypothesis to make medicine a true living science."

No one dissented. ❖

Matt Schaefer is an archivist at the Herbert Hoover Presidential Library. His research on the acceptance of the germ theory in Iowa began with an Annals of Iowa research grant.

Family Skillets and Rubber Gloves

After 1867, when British surgeon Joseph Lister had demonstrated the need for antiseptic practices to prevent infection, doctors and hospitals gradually adopted the practice of sterilizing instruments, using masks, scrubbing hands, and, later, wearing rubber gloves. The lack of these measures had rightfully contributed to the public's long-held belief that hospitals were to be avoided. It also contributed to the alarmingly high mortality rate among new mothers who contracted infections.

Despite efforts by the State Board of Health and the Iowa Medical Society to publicize important discoveries in science, some Iowa doctors and much of the public were slow to comprehend the deadly power of certain bacteria. In "A History of Medicine in Jefferson County, Iowa," James

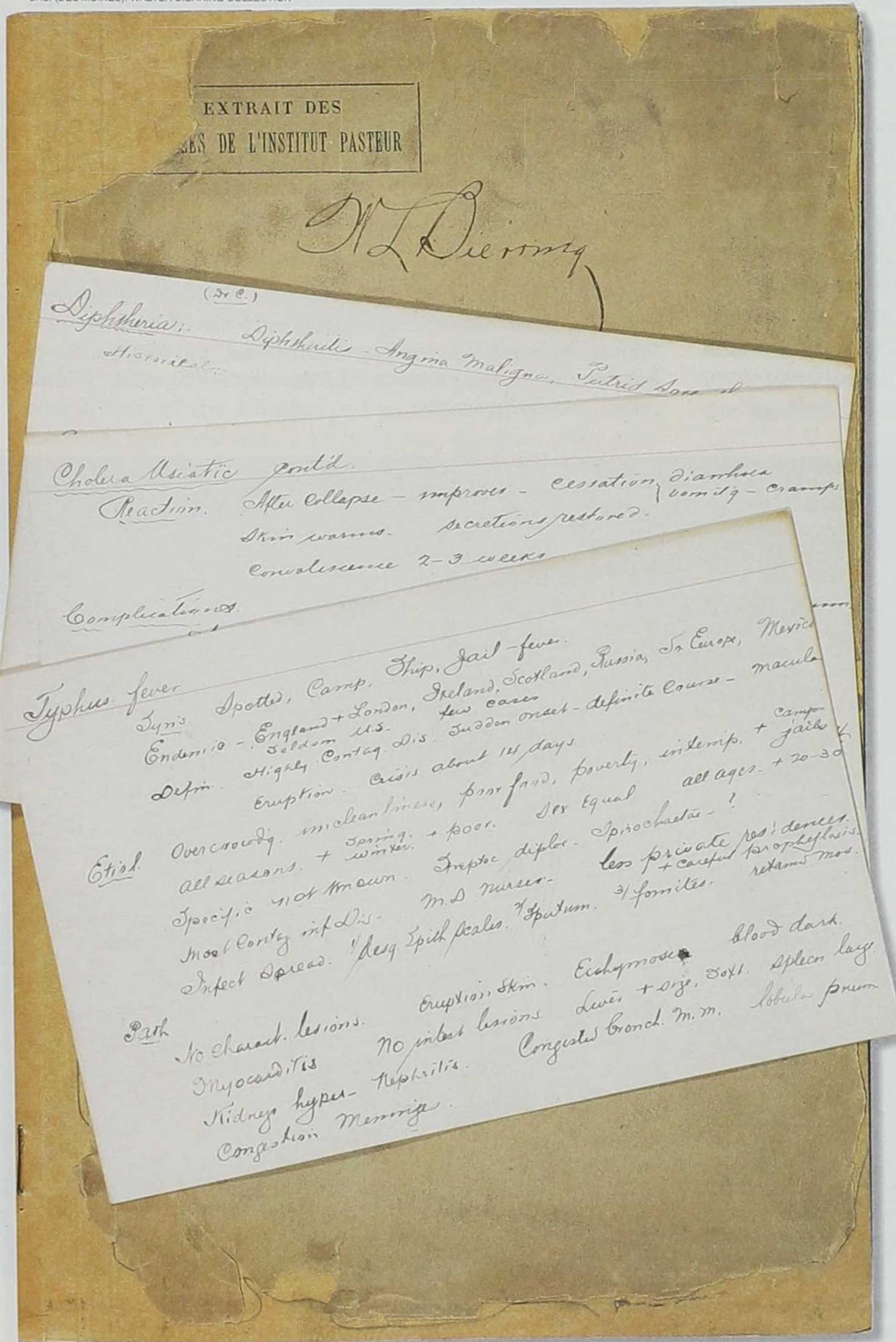
Frederic Clarke described two troubling accounts. In the first instance, a physician had "made a night call in the country and had to stay for several hours. The patient had a severe bronchitis and was using the family skillet for a sputum dish. When time came for breakfast the good wife emptied the skillet and cooked in it her bacon and eggs."

Clarke also tells how in 1912 "Jefferson county surgeons first began to wear rubber gloves during operations. . . . The operating room nurse in the Jefferson county hospital threw away one of the two pairs of rubber gloves owned by one of the surgeons, because they were full of holes. The doctor reprimanded this nurse for her wastefulness, saying: 'Those were my obstetric gloves.'"

—The Editor

Deadly Diphtheria and Walter Bierring

SHSI (DES MOINES): WALTER BIERRING COLLECTION



Iowan Walter Bierring diligently made these notes on diphtheria, cholera, and typhoid while studying in bacteriology at the Pasteur Institute in Europe. Bierring had completed the State University of Iowa's three-year course to become a physician in a half year. Lawrence Littig, the first faculty member to teach bacteriology, in 1889, sent Bierring to Vienna in 1892 for post-graduate work. Bierring returned to Europe in 1894; his study there resulted in significant advances for Iowa.

by Susan C. Lawrence

For many in Iowa, the awareness that science was rapidly producing new knowledge [arrived at that moment] when a physician, armed with a swab, demanded a throat culture from a sick child, with the peculiar news that it would be sent away to a laboratory to confirm a diagnosis of diphtheria, and prepared a syringe to inject a substance derived from the blood of horses. Bacteriology more than any other biomedical research of the late 19th century, brought a new kind of science into the homes of Iowans, although hearing about mysterious germs and getting strange injections hardly translated into public support for the laboratory or for science in general.

In the summer of 1894, Walter Bierring returned to Paris for the ten-week intensive summer course in bacteriology at the Pasteur Institute. Near the end of the summer, he watched Emil Roux take the stu-

dents step-by-step through the process of making diphtheria antitoxin by injecting horses with diphtheria toxin, recovering the serum, and using it on patients at the institute's hospital. The success of the antitoxin treatment was announced to the world in Budapest that fall, and it became a major news item in the popular press. Bierring's return to Iowa thus brought more than his sound preparation to teach medical students. At the same time that . . . a newspaper campaign [was being orchestrated in New York City] to fund production of antitoxin by the New York City Board of Health, Bierring was making antitoxin in Iowa.

Bierring did produce about 300 doses, which were used to treat diphtheria that year, but otherwise physicians had to purchase it from commercial sources. Physicians did use the antitoxin, usually with excellent results, but suspicions about the "horse juice" remained among both doctors and lay people well into the 1920s.

Diphtheria was a frightening childhood disease; mortality could be as high as 60 percent during an epidemic of a particularly virulent form. The antitoxin was by no means an infallible cure, as it needed to be given

early and in large enough doses to be effective. Before the creation of the antitoxin, the Iowa State Board of Health had tried to manage the disease with notification and quarantine, as diphtheria spread rapidly in schoolrooms and was taken home to infect preschool children, who were the most susceptible. After 1895, the antitoxin lowered the mortality rate among those who received it, but the disease continued to take its toll in regular epidemics. Bacteriologists soon confirmed what a few physicians had already suspected: mild cases were often undiagnosed, convalescents could carry the bacillus for weeks or months after recovery, and there could even be asymptomatic carriers. Public health measures became even more vital as the complexities of the disease undermined the initial expectations that available cure meant easy eradication. ❖

Susan C. Lawrence is associate professor of history at the University of Iowa. This excerpt is from part two of her three-part "Iowa Physicians: Legitimacy, Institutions, and the Practice of Medicine," Annals of Iowa 62:2 (Spring 2003), 63:1 (Winter 2004), and forthcoming.

SHSI (DES MOINES) DES MOINES REGISTER AND TRIBUNE



Mothers await their turn in a children's clinic set up for diphtheria and smallpox immunization in Des Moines, 1935. The local health department and parent-teacher associations sponsored the clinics.

Battling Smallpox

State and Local Boards of Health

by Philip L. Frana

The first significant smallpox epidemic in Iowa after the establishment of the State Board of Health occurred in Keokuk, ironically the site of Iowa's oldest and largest medical school. This 1882 epidemic, which made national headlines, began when a student nicked himself with a scalpel drawn from a smallpox-infected cadaver. In all, 71 cases were reported to the State Board of Health, with nine confirmed deaths.

Keokuk in 1882 was better prepared than most cities to wage a war against smallpox and other pestilential diseases. Occupying a low-lying area at the confluence of the Mississippi and Des Moines Rivers, Keokuk had experience in previous decades with malaria, cholera, and yellow fever epidemics that spread along the Mississippi River. Keokuk had a well-worn pest house—a small wooden shack—on the outskirts of town where individuals with smallpox, malaria, and other afflictions were isolated. Medical facilities beyond the ramshackle pest house were far in advance of others in the state, with the possible exception of the recently established medical department at the State University in Iowa City. Keokuk had a ready supply of physicians and students willing to practice their arts on the local inhabitants.

Smallpox broke out in town on Christmas Day, 1881. Keokuk had no effective local health board in place to deal with this epidemic, although the municipal code charged the mayor and council with the responsibility. This was not unusual. Keokuk had no board during the devastating cholera epidemic of 1876, or during the recurrent smallpox epidemics of 1862–1864.

Hastily, then, a local board of health was formed of city officials, trustees, and physicians to issue proclamations quarantining all those suspected of exposure to the disease. At the same time, two local newspapers, the *Keokuk Constitution* and the *Weekly Gate-City*, were enlisted to salvage the city's image and economy.

Efforts of the Keokuk board came too late for the afflicted, although its promotion of vaccination certainly protected many. The board's first action—closing the medical college where the disease originated—backfired. Since none of the students and faculty at the institution lived in on-site dormitories, the gesture was

meaningless as a quarantine strategy. In fact, school closure provided the excuse for “a stampede of the students” to their homes in the tri-state area. Towns across the region bashed the Keokuk board in the press for its inability to control the epidemic. The city council of the town of Warsaw, only five miles from Keokuk, warned its residents to “abstain from all communication with said city of Keokuk,” and recommended that local hotels turn away all “strangers or visitors” for the duration.

The board's vaccination efforts began with local schools, and by January 16 the *Keokuk Constitution* reported that “the little pretty white arms [of students] were scratched and mutilated in wholesale numbers.” The board also assigned a physician to go house to house in each of four districts in the city seeking voluntary vaccinations. They encountered unexpected public resistance. “I s'pose you've come to vaccinate us,” one woman was quoted as saying, “And ye might jest as well go away agin, for we won't have it.” At one house a “colored brother” refused vaccination because, according to him, a relative who had been vaccinated in Georgia died one month later from the measles, so none of his family was ever going to be vaccinated. At another house a young girl declined vaccination for her brothers and sisters, saying, “The folks was all away from home, sir, besides, they was all vaccinated last year, and we had the small-pox when we lived in Missouri!” Others argued that American rights to freedom and independence implied the right to refuse vaccination.

In response to such resistance, the board demanded that the public give vaccinators “courteous treatment” and allow them to “enter into the work of vaccination at once” as they were “using none other than bovine (animal) virus of the purest quality.” Although no penalties were drawn up for noncompliance, the majority of Keokuk's population had been vaccinated or revaccinated by the end of February. “The common remark now is, ‘don't touch my sore arm,’” reported the *Constitution*.



COURTESY SUSAN C. LAWRENCE

Photos of smallpox in State Board of Health publications helped doctors distinguish it from chickenpox and other similar-looking diseases.

Efforts by the local board to promote vaccination and quarantine were further hampered when the medical college's officials insisted on reopening the school immediately and local businessmen sought to minimize the impact on trade. The competing factions eventually reached a compromise, and following a thorough disinfection of the dissecting laboratory, the school reopened.

In the wake of the epidemic, Keokuk citizens wanted to snatch their economic chestnuts from the fire. As long as there were reminders that smallpox raged in the city, business would remain stagnant, as rural farmers, purveyors of merchandise, and river traffickers refused to enter town. "The hotel registers begin to tell of the effect the small-pox scare in this city is having on the outside world," reported the *Constitution*. "The arrivals now are about one-third the usual number." Worries about potential loss of income caused the local press to begin noting instances of unfair quarantining against Keokuk.

Within a week of the first smallpox deaths, the *New York Times* published a report of the "ravages of smallpox" afflicting Keokuk. Local health board president D. B. Hillis responded, "There is a limited number of cases confined entirely to medical students, and there is as yet no assured tendency to spread among citizens outside." The local press attempted to reeducate misinformed individuals who accepted unconfirmed stories as fact or who wrongly condemned the local board's efforts. "All kinds of wild and unfounded rumors still continue to exist," wrote the editor of the *Constitution* two weeks into the siege, "the generally accepted one outside of the city being that there are forty cases when there are only about ten."

Whatever response was to be made to the epidemic had to come from local sources; the State Board of Health offered no help. The state board instead spent most of the first three years of its existence setting up a rudimentary system of gathering information. It took two years alone to collect incomplete statistics on births, deaths, and marriages from Iowa's ninety-nine counties for the single year of 1880. Later, use of telegraphy greatly enhanced the board's ability to collect data speedily, especially after it instructed county clerks to charge all communications to the board. But Keokuk officials handling the smallpox epidemic of 1881-1882 could not legitimize their efforts by appealing to a more objective outside body, nor did they wish to.

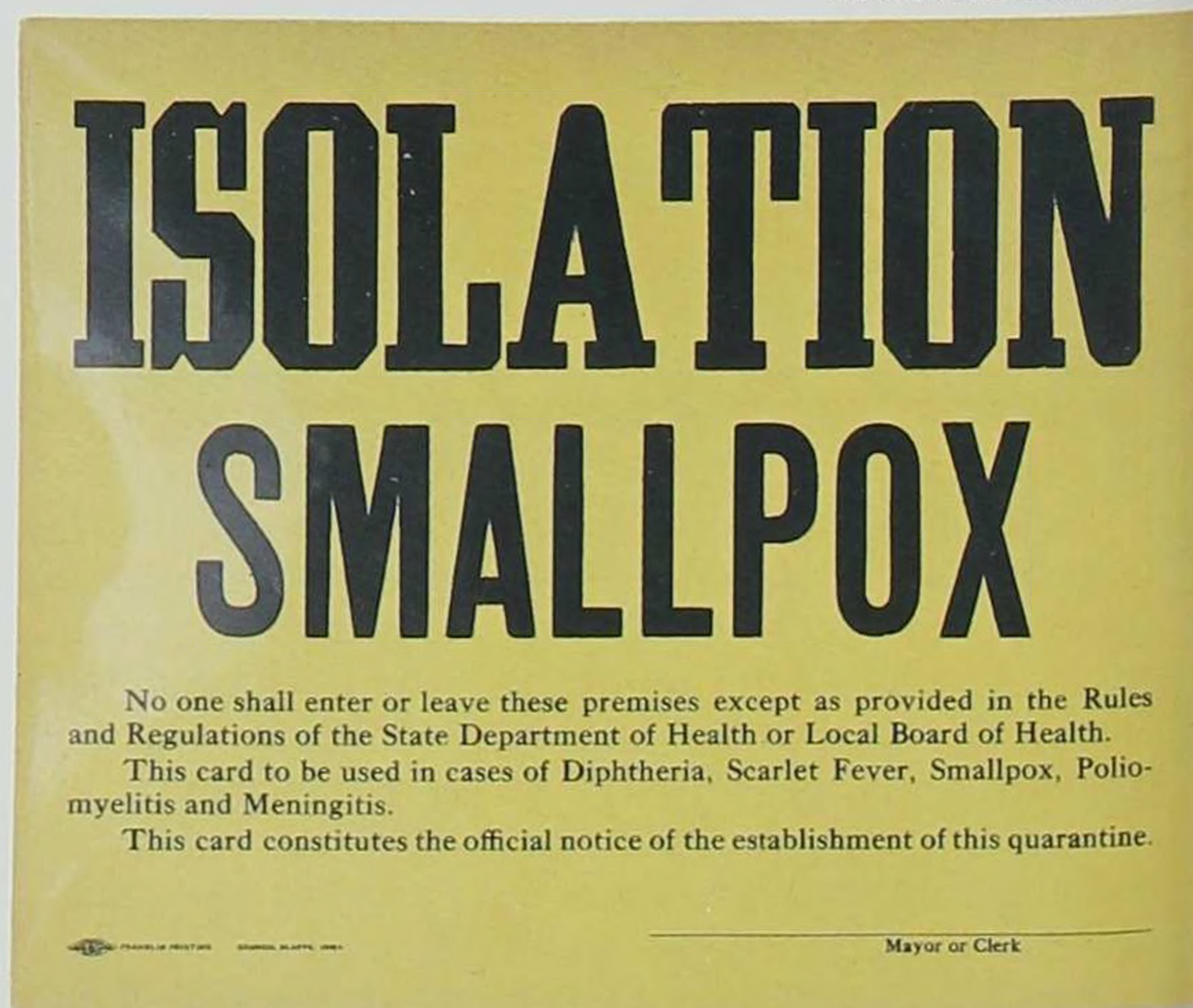
Within five years, local authorities did begin using such a resource, as they drew expertise from a state board devoted to promoting public health. Remittent importations of smallpox into rural Worth County from 1886 to 1904 illustrate how local boards gradually yielded authority to the state

board. The local response also suggests that citizens perceived in the outbreaks an outside threat to their way of life. Many times over the years, new immigrants and travelers imported smallpox epidemics into this rural community. At irregular intervals, dozens of people fell ill from the disease, and a few lost their lives.

Two smallpox epidemics in particular are significant in describing disease fighting by both the local Worth County boards and the state board. In response to a new local code requiring that the state board be notified of all epidemic diseases and noxious hazards, both physician D. S. More of Northwood and the clerk of rural Barton Township in eastern Worth County reported in July 1886 "a number of persons exposed" to the contagion by a recently arrived German immigrant family. In December 1899 a separate epidemic began, which authorities traced to a street carnival in Albert Lea, Minnesota. One of the fair-goers, it was reported, was "allowed to go about at large in Northwood, with a small-pox rash broken out on his face and all over his body for nearly forty-eight hours."

Resistance from within the German-born population to measures taken by local officials justified the state board's decision to step in and attempt to reestablish order during the 1886 epidemic. In response to reports from local officials, the state board had wired the Barton Township clerk to "establish vigorous quarantine of all small-pox cases and exposed persons, and order and enforce general vaccination, to prevent spread of disease, and obey rules of State Board." The same day the Barton Township Board of Trustees wired back that all

SHSI (DES MOINES); MUSEUM COLLECTIONS



Quarantine signs helped control the spread of diseases.

efforts to secure compliance had been thwarted by a popular challenge to their authority, and they did not know how to deal with the "ten or fifteen exposed persons [who] refuse to obey trustees." The *Worth County Index* recounted in its first story on the epidemic in Barton Township, "The local board quarantined the Dietrick and Brown families [where the smallpox had first erupted], but were powerless to enforce their orders, and the German minister of Grafton, as well as many of the neighbors visited the sick daily and insisted that it was not the small pox and there was nothing to fear."

At that point the state board and the county sheriff were called in. The secretary of the state board reported that local officials manifested "an earnest desire . . . to do all that was necessary to get rid of the scourge, but they did not know what to do. They were further embarrassed by the interference of pretended physicians who pronounced the disease not smallpox, and advised resistance to all orders of the local board." Compounding the problems, the doctor hired to vaccinate county residents skipped town and was not heard from for many weeks thereafter. Another doctor hired by the state board to treat smallpox cases in Barton Township was not allowed to return to his office in Northwood for fear that he "would not know enough to properly disinfect himself before leaving the infected houses."

Under increasing pressure from the state board, local officials began arresting and prosecuting those who refused to obey the quarantine. Two members of the Dietrick family were fined twenty-five dollars each, while a similar case was remitted on the grounds that the defendant was "a Dane who recently arrived in this country and he was not sufficiently acquainted with the language to understand that the town trustees had provided means for furnishing all necessary supplies to the parties who were quarantined." Clearly, the *Index* reported, township officials had shown that they "don't propose being trifled with."

In 1899 rumors of a renewed outbreak of disease abounded in Worth County. According to attending physician J. Herbert Darey, "cries of 'Cuban itch,' 'Philippine itch,' 'chickenpox,' 'ruin the holiday trade,' etc. were heard on all hands, till the mayor, at the insistence of a number of the leading citizens, did what I requested him to do on the start, viz:—request the State Board of Health to send an expert to Northwood, to see if it was really smallpox or not." State Board President J. C. Schrader arrived from Iowa City in short order and concluded that the cases in question were indeed smallpox, though of an attenuated form. Resistance to vaccination efforts in Silver Lake Township were also overcome when reports of the malady mailed to the board in Des Moines returned with a commandment to quarantine for fear of smallpox.

This time the state board directed most of the actions of local health boards. While aiding in the writing of an extensive code concerning public health in Northwood, the state board directly implemented quarantine and preventative measures. The board also encouraged county mayors and aldermen to exercise their right to create local boards of health where there were none. Local boards were also instructed in the disinfection of homes and were legally empowered to remove a "sick or infected person to a separate house, if it can be done without damage to his health, and [to provide] nurses and other assistance and supplies, which shall be charged to the person himself, his parents or other person who may be liable for his support, if able; otherwise at the expense of the county to which he belongs." In turn, local authorities drew up a new Northwood ordinance, which included more than thirty sections concerning disease control, burials, and penalties for defiance. Finally, a state law passed in 1897 enabled the local Worth County boards to arrest those inoculating with smallpox—which unlike cowpox vaccination makes the individual a carrier of the disease—or knowingly using public transportation while infected.

The *Index* itself served to defuse panic as the smallpox advanced, dispelling wild speculation and providing constructive information. "You are in no danger of catching smallpox by long distance telephone."

Although officials in Worth County relied heavily on the authority of the state board of health, the limits of the board's intervention were apparent even at the turn of the century. Those limits are demonstrated in a smallpox epidemic that affected a wide area of southwest Iowa and eastern Nebraska in 1898–1899. The *Fremont Democrat* portrayed a county under siege by an invisible invader that threatened the economic life of the city. Blame for the debacle was placed squarely on its neighbor across the Missouri River, Nebraska City, where smallpox had gotten completely out of control. This epidemic revealed most strikingly the inability of the local Fremont County boards to control what had become an interstate problem.

The State Board of Health did offer its encouragement and limited support as the epidemic threatened to engulf the state. By the late 1890s, the board was waging war against disease on a number of fronts. It was, for example, encouraging improvements in sanitary and water systems and the development of a new diphtheria vaccine. Epidemic outbreaks were reported by wire directly to the board offices in Des Moines, then transmitted to health officials and appointed district officials who could benefit from the knowledge. During the smallpox epidemic of 1898, the city clerk of Ham-

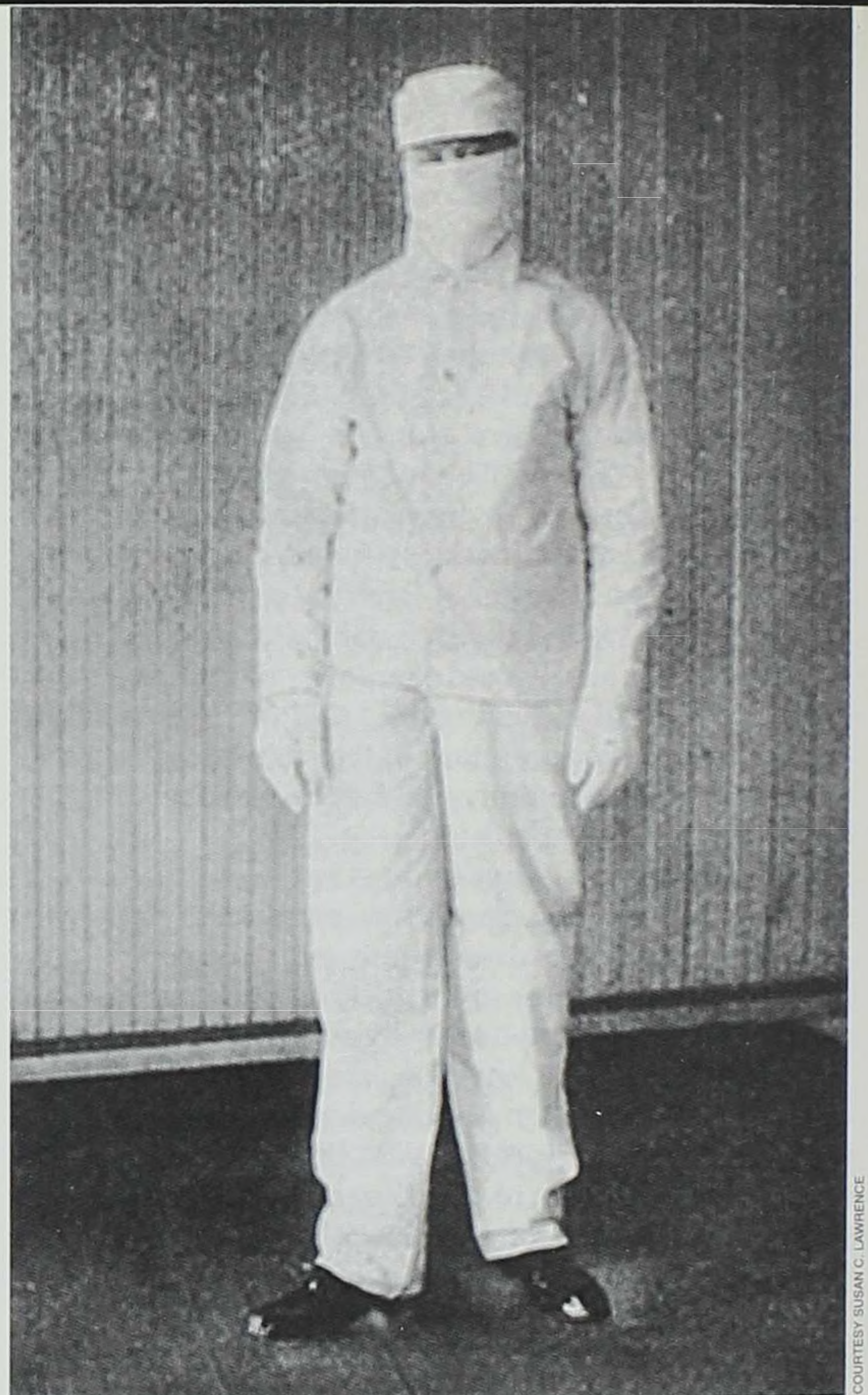
burg and local boards of health remained in constant contact with the state board. The state board had offered indirect support to local communities since the mid-1880s, but asserted vehemently that its advice was "given for the benefit of local boards that they may more fully understand their duty in the premises, and the necessity for prompt and vigilant action." Thus, local boards were charged with ultimate responsibility for ending smallpox incursions. Educated by the state board, they were to prepare carefully for epidemics and act judiciously when they struck.

The Fremont County epidemic began in mid-November 1898, when Mrs. Samuel Townsend returned from a visit to a married daughter in Nebraska City who was sick with an "eruptive fever, but not well defined." Although Mrs. Townsend was only mildly affected herself, her family was quickly and seriously infected. On November 18 the city clerk telegraphed the state board to report the outbreak. He noted that the mayor had appointed four police to guard the Townsend residence. The same afternoon, local physician W. L. Bogan wired the state board to ask what additional steps should be taken to stem the spread of the smallpox.

The next day Hamburg's local press, the *Fremont Democrat*, began reporting the course of the epidemic as it spread outward from the Townsend family and from a felled contract laborer home from Nebraska City. The *Democrat* praised the mayor and town physicians for their quick reaction to the disease and the subsequent quarantine. The paper noted with concern, however, that another of Mrs. Townsend's daughters had continued to attend public school, much to the consternation of the teachers and pupils. Further infection arrived by steady communication across the railroad trestle bridging the Missouri. "We have quarantined against Nebraska City, Neb., but we are unable to place a quarantine at the bridge," lamented the city clerk in a communication to the state board.

As alarm spread, other Fremont County communities began to request the state board to step in and establish a more secure quarantine against Nebraska City. J. A. Armstrong, Percival's mayor and de facto local health board president, requested that the state board draft men to guard the bridge spanning the Missouri. "A great many people are daily passing from Iowa into Nebraska City for the purpose of trading," wrote the mayor. "Consequently, we are very anxious to have guards stationed there." Strict quarantine "would have been done before now if our local board had understood the necessary steps in the proceeding. . . . We shall be very glad to have you take active measures at once."

Pleas received from officials in Hamburg, Percival, and rural Fremont County townships prompted the state board to send [Board of Health] district physician



COURTESY SUSAN C. LAWRENCE

"A Simple Method Whereby a Physician May Properly Prepare Himself to Visit a Home Where a Contagious Disease Exists" (Iowa Health Bulletin supplement, July 1911).

Dr. McKlveen to report on the situation first hand and explain to local boards the principles of restricting smallpox. The task was more formidable than either the state board or McKlveen had anticipated. Not only would they have to quarantine the railroad and wagon bridge that connected Nebraska City with Iowa, but also miles of the riverbank as well, "as the river is frozen over and persons can cross on the ice."

One of McKlveen's most important duties was to disseminate information concerning the prevention of smallpox. As the disease continued into the spring, instruction provided by McKlveen encouraged vaccination and disinfection. McKlveen suggested that all structures containing smallpox patients be thoroughly fumigated, and the board issued a pamphlet recommending the best means. Their advice was followed throughout the county. When two fresh cases of smallpox appeared in Hamburg in May 1899, for example, a local doctor wrote that "all doubtful clothing, bedding and draperies were burned. . . . I had the stable and the

horses disinfected, also the privy vault, by using a solution of sulphate of iron and carbolic acid. I had the yard raked and rubbish burned, then had the yard and walks sprayed with solution of sulphate of iron." Moreover, Bogan "had the parties all bathed, then washed in a solution of carbolic acid and dressed in clean clothing. I had each room fumigated with sulphur, cooled them off, and then used formaldehyde for six hours, opened the appartments [*sic*] and thoroughly ventilated them, and moved the family in; considering there was no more danger." Although it is doubtful that any of these techniques worked, they do illustrate the degree to which local boards responded to the state board's authority.

Persons exposed to smallpox in Nebraska City were in Hamburg nearly every day, and many cases undoubtedly went unreported for fear of inviting quarantine at home or in a drafty building outside the city limits. Town leaders quarantined against Nebraska City reluctantly, hoping that this time the health board's edict would be obeyed.

Nebraska City citizens, in their turn, believed that the epidemic had started among the more than 2.5 million people who attended the Trans-Missouri Exposition held between June 1 and October 31, 1898, in Omaha.

The Hamburg-Nebraska City epidemic of 1898-1899 probably arrived via a Missouri River steamboat. There was, however, an even more disquieting way for smallpox to enter the state. Iowa's Board of Health recognized that passenger rail travel, and especially the immigrants aboard the trains, carried the potential to spread disease. The board documented cases of immigrants, travelers, or hobos infecting Iowa communities. Many articles in the public health journals and newspapers of the period lamented the double-edged sword of railroads and disease. The secretary of Iowa's board worried about the lack of control over this moving menace. "A great deal is being said about the commercial value of railroads," he noted, "and yet they have a sanitary value hardly less important." As local Iowa communities drew life-blood from railroads that had given birth to them, so also did they suffer from the railroads' occasionally deadly cargo. Rural towns were much less likely to refuse trains than for railroad companies to refuse service to towns suffering localized epidemics. The state board made numerous attempts to reduce the risk, but most were imperfect, ill conceived, or simply not in the best interests of the railroads. Still, encouraged by state and national boards of health, the railroads made efforts to vaccinate employees, disinfect passenger cars, and selectively forbid passage to those with obvious cases of disease.

The increasing number of smallpox cases in Chicago had prompted a special meeting of the Chicago Board of Health and other midwestern health boards. Conferees at this Chicago Smallpox Conference in 1881 included Iowa State Board Secretary R. J. Farquharson. "In view of the fact of the frequent introduction of small-pox into the interior of Iowa from immigrants," said Secretary Farquharson, "the Iowa State Board of Health would respectfully request the National Board of Health to secure the vaccination of all unprotected immigrants before they leave the ports of arrival in this country." Some conferees denounced the feeble efforts made by eastern ports to prevent diseases from propagating. Others complained that midwestern termini were becoming dumping grounds for sick immigrants.

The Chicago Smallpox Conference and the pleas of midwestern public health authorities drew a response from the recently created National Board of Health, which created a special Immigration Inspection Service in June 1882 to check railroads, ocean steamers, and river transport for disease. Doctors were hired across the nation to inspect and vaccinate immigrants and travelers. From the start, though, the Immigration Inspection Service was ineffective in stemming the flow of disease across the Atlantic and from east to west. Inadequate numbers of inspectors were overwhelmed by the task.

The Immigration Inspection Service had little immediate impact, but its existence had important ramifications. It contributed to the sense that "every organized community should be provided with a competent board of health, and the State with a State Board, supplied with every requisite for aiding and directing the local authorities in their sanitary work." More importantly, though, for a short time the Immigration Inspection Service was a visible reminder that disease was more than a local phenomenon, one that demanded coordinated efforts, and it provided a national forum for discussing ways to combat the health problems related to integrated, global transportation systems. In 1883, as the service was being phased out due to budget cuts and political infighting, sixteen local and state boards, including Iowa's, submitted a blanket recommendation to the National Board pleading for its continuation. These boards noted that "this inspection service is such that its benefits have no relation to State boundaries, but its protective influences extend widely throughout this country; consequently, expenses therefore should not properly be borne by any local or State board of health."

Although state veterinary surgeons had drawn up lengthy regulations to certify the health of cattle coming from areas where disease was plentiful, few similar laws were on the books for humans until the 1890s. The Immigration Inspection Service and the Iowa State Board of Health spurred Iowa rail companies to detain

passengers who had obvious symptoms of smallpox, were incapacitated by dysentery, or were suffering from undiagnosed fevers. Iowa railroad stationmasters responded by disinfecting passenger cars just prior to their use. General Manager Marvin Hughitt of the Chicago & North Western Railway Company ordered his employees and officers to inspect "passenger coaches, and especially those used for the transportation of seaboard emigrants" and make sure they were "thoroughly cleaned throughout" after every run. In 1894 management for the Chicago, Milwaukee, & St. Paul Railway issued a circular making it the "duty of conductors to report by wire to their superintendents and the secretary of the State Board of Health any person on their train suspected of having small pox or cholera." Station agents were to report to the local board of health the arrival of all immigrants so that the board could inspect the immigrants and their baggage. Still, economic concerns prevented the national and state boards from demanding reform from railroad companies.

The Chicago & North Western Railway epidemic of June 1889 provides an example of the rail-borne vector for smallpox in Iowa. The epidemic spread virtually from one end of the state to the other, although only two exposed individuals died. Imported among German immigrants aboard a crowded passenger train, smallpox pustules were apparent on the face of one immigrant as the train entered the state. Nevertheless, no action was taken until stations along the route began complaining by telegraph to the state board. Clinton, Marshalltown, Nevada, Boone, and Jefferson each charged that smallpox had made its appearance in their communities coincidentally with the arrival of the train, leaving sickness in its tracks. Apparently, none of the station managers bothered to wire ahead and spare the next town. When the state board requested that exposed passengers be taken into protective custody, the mayor of Wall Lake in Sac County refused, saying that the board had to remove them from the community. The train was then sent on its way. At Galva, obstructions placed on the tracks forced the train to stop. The train was then moved onto a siding, and state board physician J. D. Miller quarantined the passengers and crew. The caboose in which the infected passenger had been riding was dragged to an Ida County gravel pit, where it was disinfected and abandoned. Regarding such problems as this, Secretary Farquharson was prompted to write, "Something more is required than the inspection and vaccination of passengers." Farquharson advocated the total isolation of immigrants on their journeys, sealed in their own cars as they crossed the state.

Finally, in 1891 Congress ruled that immigrants were to be screened both for pestilential diseases and epilepsy as well as for their moral character. That legislation did

not remove the immigrant vector for disease, but it did lessen it substantially. The widening scope of activity by the United States Public Health Service also limited the extraterritorial introduction of disease into Iowa and the nation. Facilities for quarantine of vessels were constructed at significant points of entry each year until detention stations were in operation at every major seaport and border crossing in the nation.

Concern about smallpox slowly weakened as the turn of the century approached, not because of the activities of health organizations, but because *V. minor* replaced *V. major* as the main type of infection. Mild cases of the disease were already present in Iowa by the 1880s and were often confused with chickenpox. Still, they could elicit panic. Des Moines adopted a siege mentality when two young boys and three girls in two families were incorrectly identified as exhibiting smallpox in 1892. Although the children began recovering within the week, the physician employed by the board of health to attend the children "stoutly maintained that the disease was small pox and urged the board not to release the quarantine." Three more weeks passed before the quarantine was lifted. "It seems incredible," state board physician E. H. Carter wrote later, "that in the city of Des Moines, two families should have been taken from their homes, placed in a pest house, guarded by officers and kept there for nearly a month during the development of six or eight well marked cases of chicken pox."

By the turn of the century, the changing nature of smallpox had a similar effect on the state board's approach to the disease. Instead of stressing its mortal effect, the board issued posters and other pamphlet material designed to portray those who refused vaccination as uneducated, and those who suffered the disease as threats to society.

In the preceding decades the Iowa State Board of Health had added a new voice to the debate over the relationship between epidemic disease, immigrants, and the marketplace. However, the board could do little to prevent the further spread of smallpox but share its expertise and lend its authority to encouraging the use of the cowpox vaccine and the quarantine of exposed persons. ❖

Philip L. Frana is assistant professor in the Honors College at the University of Central Arkansas. This article is excerpted from his longer article, "Smallpox: Local Epidemics and the Iowa State Board of Health, 1880-1900," published in the Annals of Iowa, 54: 2 (Spring 1995), 87-118.

Lorenzo Coffin and Railroad Safety

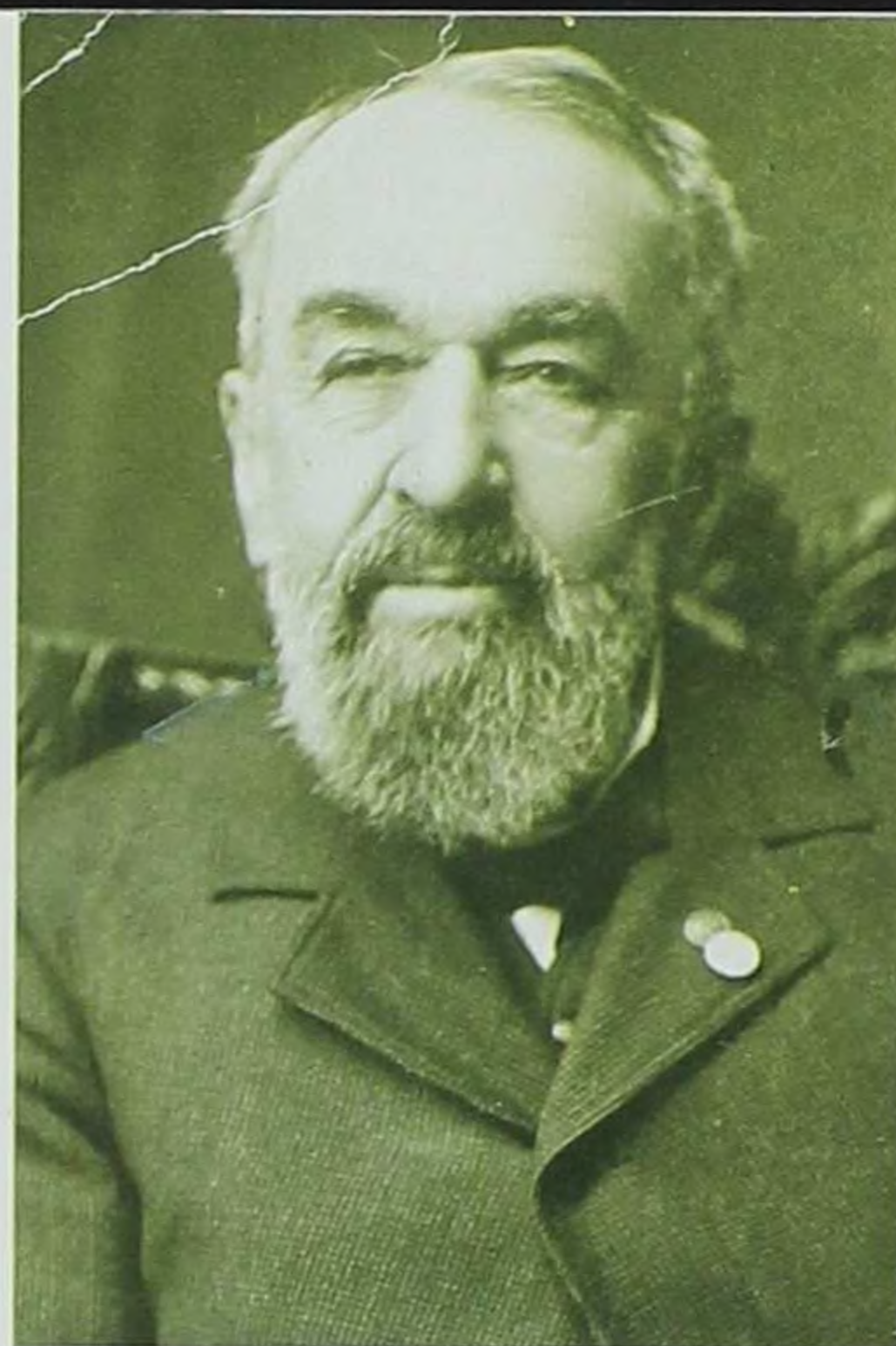
by *Tim Lane*

In Boone County there is a bridge named in honor of Kate Shelley, the 15-year-old who braved rising floodwaters to stop the midnight express. Yet there is no structure named for Lorenzo Coffin (a contemporary of Shelley's who resided one county north near Fort Dodge). Shelley was credited and lauded for saving hundreds from death and disability in one night's work. Coffin's numbers saved would be expressed as countless thousands. Shelley's effort was a dramatic Hollywood-style, cliff-hanging affair in which she crossed a railroad bridge despite flood and storm. Coffin's effort was a long, drawn-out, grass-roots measure to enact basic worksite safety for the rail industry that eventually became the standard for the nation.

Shelley performed her high-bridge act on July 6, 1881. At that point Coffin had been rallying support for safer conditions for railroad workers for seven years and would continue for twelve more.

While traveling by rail in 1874, Coffin witnessed an accident when a brakeman attempted to manually hook a freight car to the train he was riding on. The task was far from simple or safe. The link-and-pin coupling method required the brakeman to drop a pin between two iron loops as they came together. On this particular morning the brakeman miscalculated and his right hand was caught between the two cars. Two fingers were instantly sheared off. Many of his fellow workers probably considered him lucky that he had only lost two fingers, given the daily hazards of railroad work; most injured workers were released without compensation.

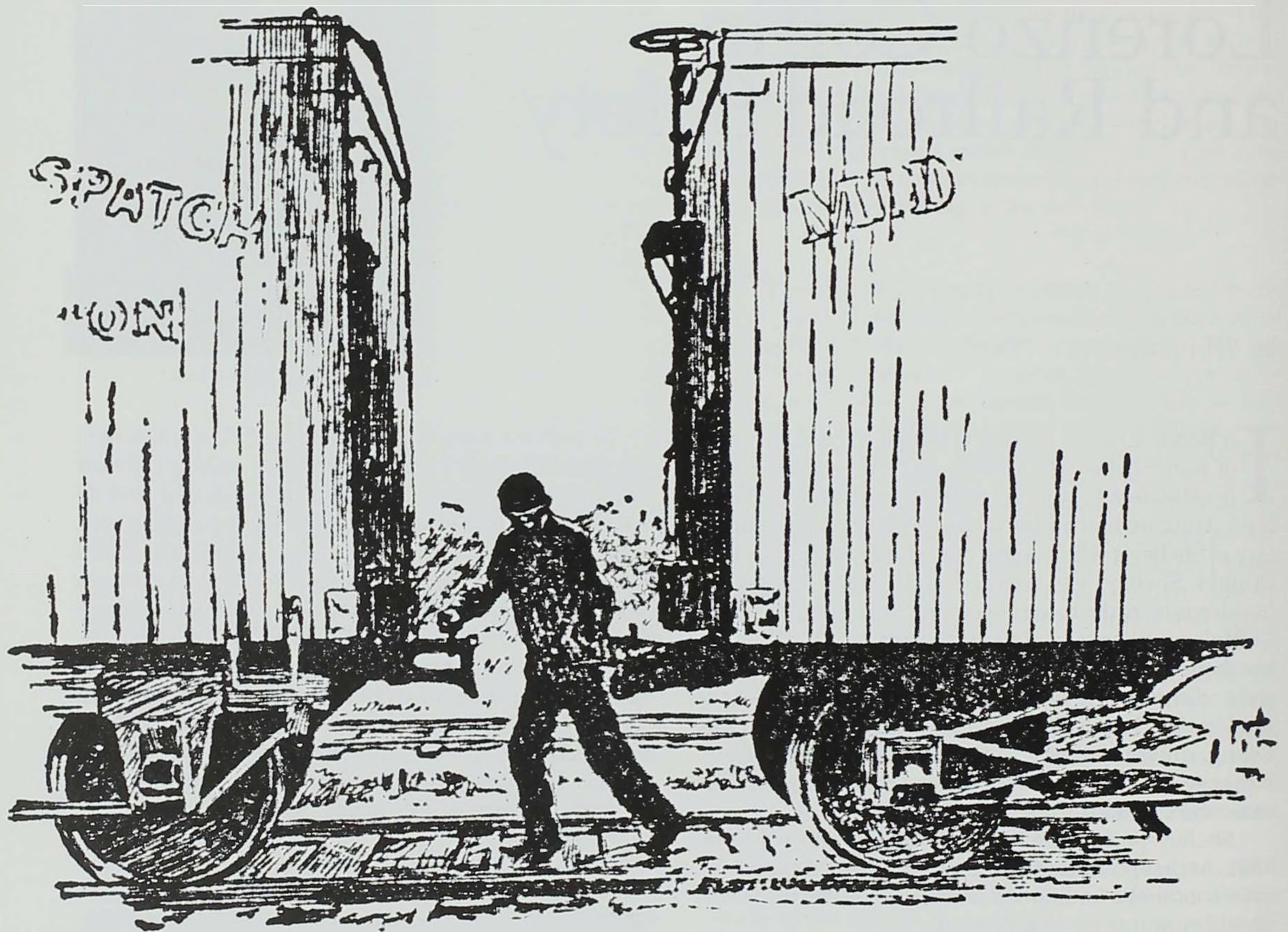
At this point in his life, Coffin was 51, a minister, and a progressive farmer. That morning on the train he became a crusader. He initiated a one-man campaign to address the apathy of the public and the railroad regarding the appalling working conditions. Coffin was destined to become the nation's most ardent advocate for rail safety and reform.



Lorenzo Coffin, 1823-1915

In 1888 the Iowa Board of Railroad Commissioners reported 101 deaths and 564 injuries among railroad employees. Of those, 19 percent of the deaths and 43 percent of the injuries were incurred while coupling cars. Across the nation it was not unusual for 20,000 to 30,000 to be maimed or killed each year. Those figures are even more unfortunate when one realizes that the technology was already available to both couple and brake automatically. Eli Janney had by then patented an automatic coupler that locked like two hands clasping, and George Westinghouse had developed a prototype air brake designed to stop a train from controls in the locomotive. Railroad officials referred to the mechanized methods as impractical, which translates into too expensive.

Few industries have been as powerful as the U.S. railroads in the 19th century. If railroads wanted time zones, they got time zones. They owned senators, intimidated the press, and controlled commerce. But Coffin was relentless, speaking to local and national railroad workers' conventions, sending thousands of letters to newspapers across the country, and addressing religious organizations. In Iowa he became a railroad commissioner in 1883 and lobbied for demonstrations to test the effectiveness of air brakes. The only reason the railroads agreed to the tests was their belief that the tests would fail. The initial tests did fail, but he kept up his advocacy. In this case the third time was the charm. George Westinghouse used these tests and their initial failure to iron out design flaws and improve his system. In 1887 in a test conducted by the Master Car-Builders Association, the air brake was able to stop a 50-car train going 40 miles an hour on a long grade west of Burlington. Westinghouse's design and Coffin's persistence had won a battle, but not the war.



Manual braking and coupling of railroad cars were incredibly dangerous practices. Iowa's State Board of Health records noted with alarm the devastating rates of trainmen's injuries and deaths and called for reform.

Coffin next needed to write and enact a state railroad safety appliance act. In 1890, the Iowa legislature passed such a law, which would take effect in three stages, 1890 to 1895. In the spring of 1893 President Benjamin Harrison signed a federal railroad safety act into law. This act mandated air brakes and automatic couplers. President Harrison signed the bill and then presented the pen to Coffin.

Under the federal law, railroads had until 1901 to meet code for interstate train cars. That year in Iowa, coupling accidents fell from 51 percent in 1878 to only 8 percent.

The advent of automatic coupling and air brakes put an end to thousands of needless deaths and injuries, but it didn't slow down Coffin. He continued cru-

sading for various social reforms, from temperance, to YMCAs for railroad workers and rural residents, to more effective treatment for ex-convicts returning to society. ❖

Tim Lane is the Fitness Consultant and ICN Coordinator for the Iowa Department of Public Health. In that capacity he initiated FITnet, a daily e-mail publication that combines health and history. FITnet is delivered to hundreds of thousands of readers around the world every weekday.

Tracking Down Disease

The University of Iowa Hygienic Laboratory

by Kathy Fait

A century ago, in Storm Lake, or Atlantic, or Decorah, physicians who suspected a case of diphtheria, typhoid, or tuberculosis had access to the best laboratory in the state. Established by the state legislature in April 1904, the Bacteriological Laboratory of the Iowa State Board of Health (now called the University of Iowa Hygienic Laboratory) had a local presence in nearly every Iowa community.

Within months of its founding in Iowa City, doctors from across the state were sending specimens there to be tested. In September, W. B. Chase in Prairie City sent in a specimen that tested positive for tuberculosis. R. C. Baker of Oelwein sent the first suspected diphtheria sample. Fortunately for the patient, it was negative. All of this information—and hundreds of more cases—were recorded in a thick ledger, now part of the library collections in the Hygienic Lab. As the century progressed, testing, diagnosing, and recording methods grew ever more sophisticated. Today, the lab's cutting-edge science and highly trained staff continue to maintain close relationships with Iowans, while identifying and protecting them from menaces to public health.

Early on, Iowa bacteriologist Walter Bierring had

championed Iowa's need for "a fully equipped laboratory" that would be "much better for the study of infectious diseases, than many a private laboratory, because it will be in intimate touch with every outbreak of disease throughout the state."

Already in 1906, the lab prepared and distributed sample kits to 677 "culture stations." In most towns, the local pharmacy became the culture station, where doctors could pick up the appropriate kits with the equipment for collecting the specimens. For a suspected case of diphtheria, the kit contained two test tubes and cotton swabs for taking a culture from the nose or throat; for typhoid, a wire loop for gathering a few drops of blood from a pricked earlobe or finger, and aluminum foil for packaging up the dried blood; and for tuberculosis, a glass bottle, with carbolic acid, to hold the sputum.

The kits included directions on collecting the material and a data card for statistical purposes for the State Board of Health. The doctor shipped the kit to the lab in Iowa City by train (the post office generally prohibited sending bacteriological specimens); the state's well-developed train system ensured that samples from throughout the state were received in a timely manner for analysis. Results could then be sent back to local doctors by mail. If a telegraphic reply was requested, the doctor would pay for the added expense. By 1910, more than 34,000 kits had been supplied to culture stations.

Always keeping up with the latest research, within only five years of its founding the Hygienic Lab was offering rabies treatment that was once available only in Paris. In the 19th century, a bite from a rabid dog meant almost certain, and excruciating, death. Then, in 1885, Louis Pasteur saved the life of a nine-year-old boy who had been savagely bitten by a rabid dog by administering a series of 14 shots of his new rabies vacci-



Harold Breese collects well water for testing at the laboratory.

PHOTOS PAGES 69-71 COURTESY OF IOWA HYGIENIC LABORATORY LIBRARY

Women have always played major roles on the Hygienic Lab staff. Here in 1920: (seated, from left) Ross Laybourn, Zelma Zentmire, and Henry Albert, the lab's first director. Standing: Helen Davis, Katherine Bronson, Ethel Collins, and Minnie Hamilton.





The Hygienic Laboratory repeatedly directed Iowans who wanted their well water tested to use the water collection kits provided by the lab (right), rather than salt-glazed jugs and bottles stoppered with corncobs, corks, or rolled paper (above)—all likely to contaminate the sample.



nation. Within months, Pasteur's cure was being used throughout Europe. That same year, four young New Jersey boys were bitten by a suspected rabid dog. The *New York Herald Tribune* raised money to send the boys to France for the vaccine and a reporter to document their journey and their triumphant (and healthy) return. This coverage helped spread the word about the vaccine, and by 1890 both New York and Chicago boasted "Pasteur Institutes" for rabies treatment. In the next 20 years, other Pasteur Institutes were begun in Baltimore, Pittsburgh, St. Louis, Ann Arbor, Austin, Atlanta, Berkeley, and Washington, D.C. Some were part of the states' public health laboratories or departments.

Iowa's Hygienic Laboratory was among those early Pasteur Institutes. It began treating rabies in February 1909. No longer did Iowans have to travel to Chicago for treatment of the dreaded disease. Instead, they could bring the dog's head for laboratory analysis and be treated at no charge in Iowa City.

Although the majority of the lab's work is done in Iowa City (or at the branch lab in Ankeny), staff members have always traveled to farms and communities when necessary and when requested by local authorities to investigate outbreaks of disease. In the early years, detailed investigations published in the Board of Health's biennial reports traced each case in the outbreak, listing the name, age, sex, residence, occupation, onset of disease, and when and where certain foods, milk, or water were consumed. These clues helped Hygienic Lab investigators track down the connections between cases that ultimately pointed to the source.

In Pella, for instance, several cases of typhoid appeared in the fall of 1915. The Hygienic Lab investigator systematically ruled out drinking water and ice cream consumed at a church social, narrowing it down to butter, and then to the dairy farm where it had been

made. The farm woman had had typhoid fever twice, that spring and as a child in Holland. All this pointed to her as a carrier.

In Clinton in 1929, 84 typhoid cases were traced to non-sterilized milk bottles. In 1930, in the Pocahontas area, an outbreak of typhoid fever in a threshing gang was attributed to a woman who had had typhoid earlier and who had helped prepare a noon meal for the threshers.

During the second and third decades of the 1900s, the laboratory focused more efforts on sanitation and public water and sewage systems. Staff also checked water in swimming pools and passengers' water supplies on trains. The lab provided an emergency chlorinator to towns with epidemics because of unsafe water. In 1914, "the desire of the residents of Postville to install modern conveniences" had led to 85 sets of new toilets, bathtubs, and sinks. "The out-flow of these installations goes into cess pools principally, which sometimes overflow into tile drains, sometimes into the alley, and sometimes, by seepage into adjacent soil. The result is that considerable amounts of unpurified sewage are finding their way to the surface of the soil and constitute a menace to health." As always when detailing investigations, the laboratory's recommendations concluded the report.

The deadly diseases that had first dominated the laboratory's work gradually became less of a threat to the state's public health. By 1928, for example, more than half of Iowa schoolchildren had been immunized for diphtheria, and in six years, cases had dropped from 242 to 34, adding hope to the "No Diphtheria in Iowa by 1930" campaign. As the number of cases of tuberculosis, diphtheria, typhoid, and rabies

waned, the Hygienic Lab focused on other diseases as well—including polio and spinal meningitis.

The world wars brought new attention to venereal diseases, and legislation mandating blood tests of couples before marriage and of expectant mothers vastly increased the burden on the lab.

During the 1950s and 1960s, blood tests began being devised to identify metabolic and endocrine disorders. Phenylketonuria (also known as PKU) was the first metabolic disease to be identified by a test performed on a dried blood spot taken from a newborn infant's heel. PKU causes mental retardation, but early diet therapy can prevent it. The Hygienic Lab's Newborn Screening Section began testing for PKU in 1966. In 1980 pilot projects began testing for galactosemia, MSUD, and hypothyroidism.

By 1983 newborn screening became mandatory in Iowa and was conducted at the Hygienic Lab's Des Moines branch lab (now located in Ankeny); the lab now tests Iowa newborns for more than 30 separate metabolic and endocrine disorders. Though rare individually, the incidence of these disorders is 1 in 4,000 newborns. With early detection and proper treatment, children can be saved a lifetime of trouble.

The 1970s brought environmental concerns to the forefront. Hygienic Lab staff increasingly tested for pesticide concentrations, lead, mercury, and other heavy metals contamination.

As has been said, the Hygienic Laboratory is



Ethel Cooper accepts a specimen from **Harold Breese**. The container probably holds a dog's head to be tested for rabies.

“known less by its efforts than by its conclusions.” Every baby born in Iowa is screened; water, air, and soil are constantly monitored; new diseases like West Nile virus, SARS, and avian flu are tracked; and bioterrorism acts are prepared for. Although the work of the Hygienic Laboratory is largely invisible, its impact is best seen in the continued good health of Iowans. ❖

Kathy Fait is the librarian at the University Hygienic Laboratory in Iowa City.



January 1941: The Hygienic Lab's serological workers open mailing tubes from Iowa's 120 draft boards. The packages contained blood samples to be tested for syphilis. Opened in 1917, the serology unit had tested more than a million blood samples for syphilis by the time of this photo. From left: **Helen (Bliss) Halperin**, **Verna (Cordes) Carpenter**, and **Eileen Wharter**.



Tuberculosis

The White Plague in Iowa

by Ginalie Swaim

Boil handkerchiefs for a half hour. Keep carpets, curtains, and upholstered furniture out of the room. Shave off beards and mustaches. Open the bedroom window night and day. Spit in a pasteboard cup (*above*) and burn it afterward. In 1906 the State Board of Health issued these directives as ways of preventing the spread of tuberculosis. Doctors and health officials fully understood that the tubercle bacillus, dis-

covered by Robert Koch and the cause of tuberculosis, was communicable through sputum. Thus, patients plagued with pulmonary TB, and their caretakers, were ordered to confine and destroy spit and to control exposing others when coughing.

Called the "white plague" because of patients' pale appearance, tuberculosis ran rampant in America's crowded cities, where the impoverished living in squalor had low resistance to disease. But it was not a disease of only the poor. In the late 19th century, TB killed one of every seven Europeans and Americans. Sanitation and quarantine had made some inroads against the disease in urban areas at the end of the century.

Early in the 20th century, public health experts fighting tuberculosis shifted to personal hygiene—thus the long lists of instructions for the in-home care of "lungers," as TB patients were called. Physicians also recommended that TB patients move to states with mountain or desert climates; fresh air and rest were among

Spittoons (left) were commonplace in taverns, hotels, barbershops, and other public places. Women's clubs and health officials campaigned for anti-spitting ordinances.



DO NOT
SPIT ON THE FLOOR
 TO DO SO MAY
SPREAD DISEASE

SHS (IOWA CITY); PAUL RIETZ COLLECTION
 SHS (IOWA CITY)

the few weapons with which to fight the persistent disease.

Prolonged and direct exposure was required to contract tuberculosis, and the tubercle bacilli grew extremely slowly. Nevertheless, the public feared that TB was quite contagious, and in time, more patients were moved out of their communities to sanatoria, where they could rest in fresh air, eat nourishing food, and limit activity—in a facility usually isolated from the public.

Iowa's oldest and largest public tuberculosis sanatorium was Oakdale, built in 1907 on 280 acres about seven miles outside of Iowa City and the university's medical college. By 1910 Oakdale housed 506 patients. The number peaked in 1926, at 814. In the late 1920s, doctors started using surgery, in which a diseased lung was allowed to collapse and rest, as another weapon against TB.

Early stages of TB were hard to detect, and many were reluctant to find out they were infected. But in 1906, an estimated 7,000 to 8,000 Iowans had TB. The State Board of Health and the Iowa Tuberculosis Association worked together to spread information about prevention and pushed for early testing. The association's annual Christmas Seal campaign, begun in 1907, raised considerable money. Later, legislation was strengthened to require that dairy cattle be tested for bovine tuberculosis (and destroyed if diseased), and to require pasteurization of milk.

Mortality rates did fall in Iowa: from 2,000 deaths in 1906; to 1,000 in 1925; and to 600 in 1934. By 1946–1947, writes medical historian Susan Lawrence, "Iowa boasted the lowest death rate from tuberculosis in the nation (11.8 per 100,000, compared with the 33.5 national rate), which had resulted from extensive efforts to identify people with tuberculosis as early as possible so that they, and those around them, could take preventive measures against its spread. State-funded tuberculin testing, along with traveling x-ray diagnostic clinics paid for by donations and staffed partly by volunteers, had eased the burden of tuberculosis before streptomycin was widely available." By 1950, TB was no longer considered one of the ten leading causes of death in Iowa,

BOTH PHOTOS: UNIVERSITY ARCHIVES, UNIVERSITY OF IOWA LIBRARIES



Treatment of tuberculosis included near-constant exposure to fresh air, regardless of the temperature. Above, patients bundled in shawls and blankets at Oakdale Sanatorium resist the cold. TB patients often slept in sleeping porches or pavilions, even when snow drifted in (below, also at Oakdale).



and in 1981, Oakdale Sanatorium closed as a TB treatment center.

Worldwide, however, tuberculosis is still the second leading cause of adult deaths—with more than two million deaths yearly. When compared to the past, it is seldom seen in Iowa, but still the state averages 30 to 50 new cases a year. ❖



Healthy Homes

Mothers, Children, and Nurses

by Ginalie Swaim

Because some babies have lived through filth is no argument that yours will."

The message in a 1911 Iowa Board of Health bulletin was harsh, but the statistics were alarming.

The United States ranked 11th in infant mortality. Between 1910 and 1913, one out of every five U.S. deaths was a child under age one. Maternal deaths from puerperal infection (childbed fever) were increasing. In Iowa, more mothers and young children died than other adults and older children. A third of the child deaths under age five were preventable; most were blamed on impure milk.

By the turn of the century, the new movement in public health was to teach mothers hygiene in the home, and to teach children new health habits while they were

still young. Iowa joined the "Save the Babies" movement early on, demanding in a 1911 bulletin (left) that "something must be done to prevent the excessive mortality among children" and giving explicit directions to mothers. "Remember that absolute cleanliness is necessary in all details of the feeding." Diarrhea, generally preventable, was a leading cause of infant deaths, especially in the summer. Because of the dangers of impure water and milk, the bulletin advised mothers to breast-feed if possible. If not they must scrupulously disinfect baby bottles and use boiled water. At the first sign of diarrhea, they should consult a doctor. Mothers must not assume that all summer rashes were prickly heat but could be something far more serious. Windows must be screened to keep out disease-carrying flies. And children must be immunized.

Women's clubs, mainstream magazines, and Extension Service agents took up the cause of better babies, spreading the advice of public health experts. Iowa was one of the first states to use better-baby contests as ways

LEFT AND CENTER: SHSI (IOWA CITY); RIGHT: SHSI (DES MOINES) DES MOINES REGISTER AND TRIBUNE



to promote child health. The contests, often at county fairs and the Iowa State Fair, attracted large crowds of participants and onlookers. Judges were not looking for the prettiest baby. Babies were scored on their health—diet, personality, and whether their height and weight fell within average growth norms. Photos were taken of champion children next to trophies, and parents won cash or merchandise, but the larger messages were that America should value healthy children (more than livestock judged at county fairs), and that much disease was preventable through education and better hygiene. Baby contests became popular in many states, especially before World War I. In 1917, the American Medical Association adopted Iowa's scorecard as a national model.

"By 1919, Iowa families could turn to infant care pamphlets, baby health contests, fair exhibits, and a few city volunteer clinics for information on how to keep their babies well," writes medical historian Susan Lawrence. "But infant mortality in Iowa, while certainly lower than the rates in many urban tenement areas, did not decline as expected." Nor did the maternal death rate.

First proposed in 1919 and passed in 1921, the Sheppard-Towner Act provided federal funds to promote maternal and infant health and welfare. Senator Morris Sheppard (Texas) and Rep. Horace Mann Towner (Iowa) sponsored the bill. Sheppard-Towner clinics were strictly for education and diagnosis—not treatment. Iowa first received federal funds in 1923. By the next year Sheppard-Towner clinics had been set up in 97 of 99 counties. In largely rural Iowa, Sheppard-Towner

clinics had the support of local farm bureaus. "Parents came miles over all kinds of roads when there was no clinic nearer," wrote a participating doctor.

Many of the nation's early public health efforts to reach mothers had ignored rural families, partly because of the mainstream assumption that rural life was inherently healthy and that farm children were rosy-cheeked children who played and worked in fresh air and sunshine. For decades, urban social reformers had even placed children from tenements with farm families. The reality, however, was that life in rural America did not guarantee healthy children. Just as families in towns and cities had to learn about preventing disease through cleanliness and nutrition, so did rural families. In addition to disparities between urban and rural living standards, farm families had less access to medical services.

Reflecting the spirit of Progressive-era reforms and armed with scientific studies, public health officials partnered with social welfare agencies to address rural

From left: Jefferson County mothers and babies at a local healthy-baby contest. Center: Charting young children's weight and height helped determine if they were within average growth ranges. Right: On an in-home visit in 1937, nurse Ruby Brouillete demonstrates newborn health care as Mrs. John Hartsock beams at her granddaughter Carolyn Ann. Brouillete was from the Washington County hospital.





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LEFT AND CENTER: SHIRI (OWA CITY). RIGHT: SHIRI (OES MONIES) OES MONIES REGISTER AND TRAILER.

needs. Between 1923 and 1927, the University of Iowa's Child Welfare Research Station conducted extensive studies in a rural school district and a rural township.

The fieldworkers rigorously evaluated the health and living conditions of rural families, particularly children's physical and mental development. They visited rural schools, checking water supplies and school attendance. The sociologists found that some farm women had no pre-natal care unless there were complications, that most had their babies at home with doctors attending, and that mothers had very little post-natal rest before they resumed their duties. The report concluded that farm families saw childbearing as "a natural function that should normally be carried on with little curtailment of regular activities and with a minimum financial drain."

Rural parents also believed that their children could not escape certain contagious diseases, and that it was best that they contracted them and developed immunity early in life.

Although the detailed study found some rural-urban differences, historian Pamela Riney-Kehberg concludes that it "revealed that farm children in Iowa were relatively healthy. Mothers had fairly good maternity care, babies relatively high birth weight, and children exhibited normal levels of health and well being."

Sheppard-Towner federal funds dried up in 1929, when the act expired. The act had been intended to encourage the use of local resources, and mothers and babies with problems diagnosed at the clinics were directed to local doctors for treatment. Although many experts argued that the clinics were desperately needed, Lawrence writes, "by the middle of 1926, the tide had turned against federal involvement in state affairs. Medical opinion lashed out particularly against the fed-

eral Children's Bureau, which supervised the act, and its domination by lay people."

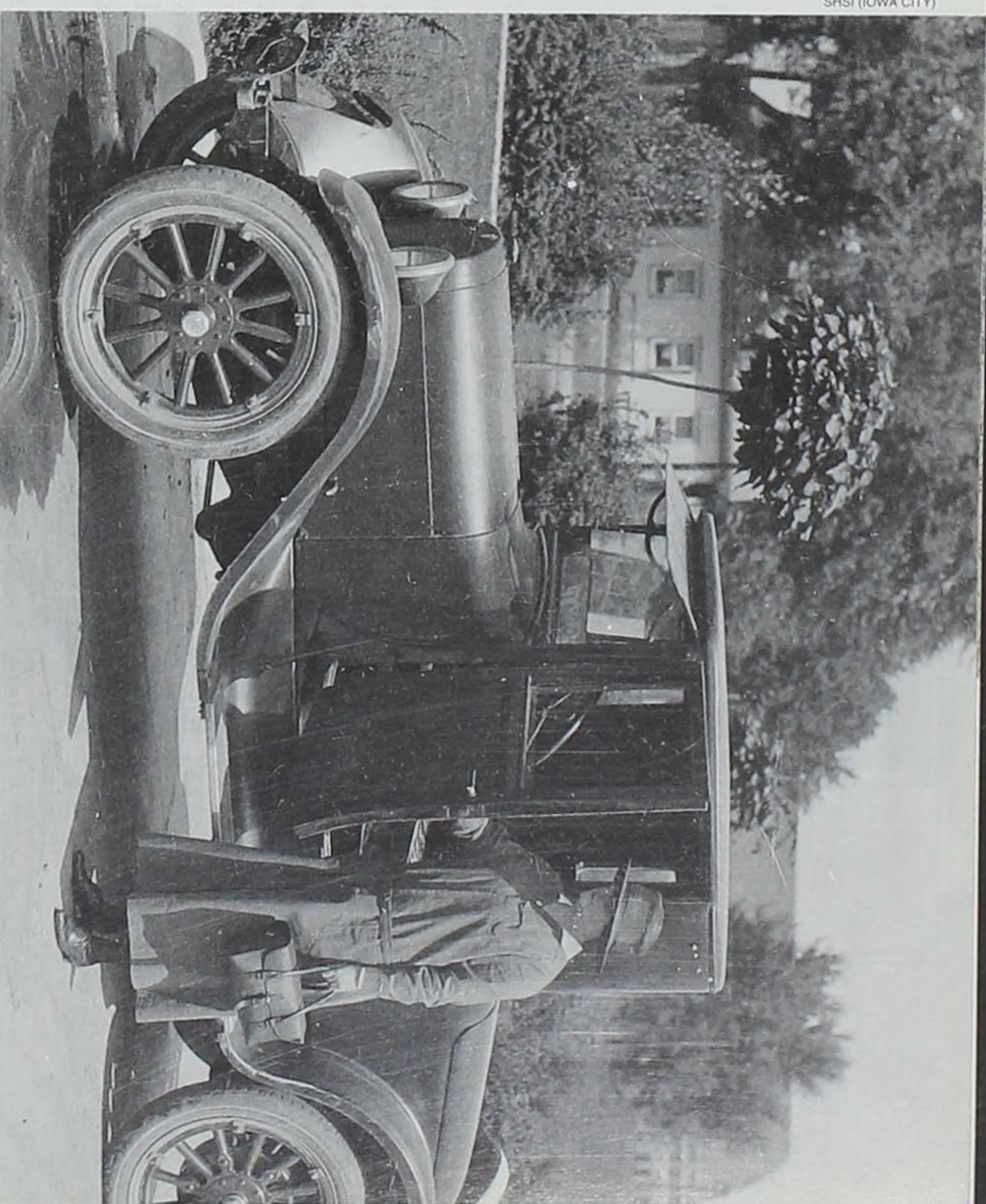
During the Great Depression, the federal WPA trained household aides to teach mothers how to best care for infants and children, the sick and the aged. By early 1940, writes historian Louise Noun, 571 aides worked in half of Iowa's counties, under the direction of the Department of Health. As World War II pulled many health professionals out of Iowa, WPA household aides assisted indigent families—nearly 5,700 by 1943.

Public health nurses also directly reached women and children. The concept of visiting nurses began in late 19th-century settlement houses, such as Lillian Wald's Henry Street in New York and Jane Addams's Hull-House in Chicago. Nurses going out and working with families in their own neighborhoods and homes became the foot soldiers of public health. They demonstrated how to care for the sick and how to prevent disease through simple sanitary measures.

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SHSI (IOWA CITY)



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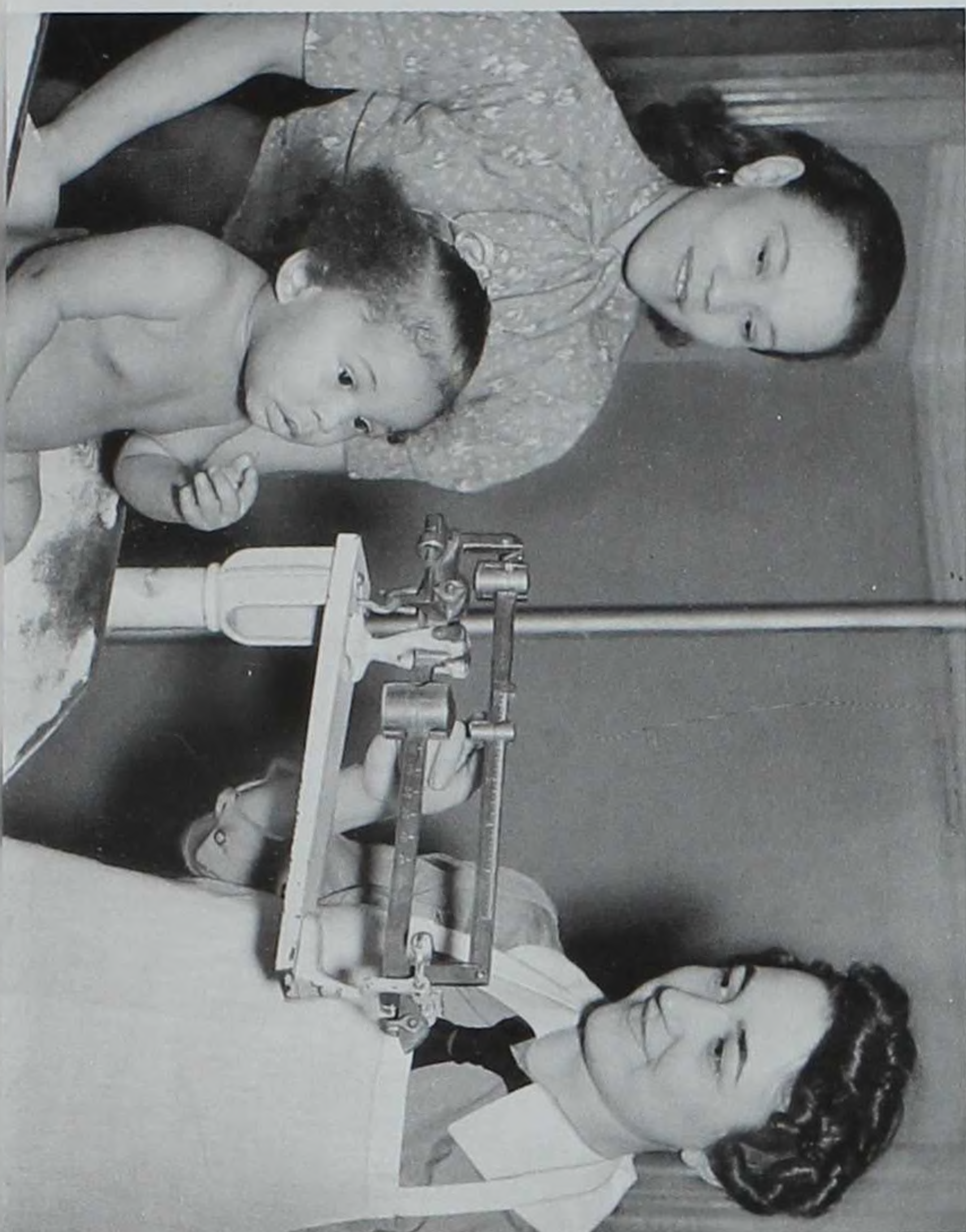
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Like Ruth Hager Cousin, thousands of public health

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Public health nursing opened up new job opportunities for women. Above: A nurse with bag in hand, 1924. Below, from left: During National Negro Health Week in 1940, Betty Lou Burrell is weighed at the Negro Community Center, as her mother, Mrs. John Burrell, watches "for any show of temperament;" Center: Dressed as "Germs, Microbes & Diseases from the Valley of Illness," students from Gaza, Iowa, participate in a health pageant, 1921. Right: Public health nurse Elna Olson checks Ina Raines for sore throat and measles in the Salvation Army center, Des Moines, 1946.

LEFT AND RIGHT: SHSI (DES MOINES); DES MOINES REGISTER AND TRIBUNE; CENTER: SHSI (DES MOINES); MARY TURNER HAGER COLLECTION



needs. Between 1923 and 1927, the University of Iowa's Child Welfare Research Station conducted extensive studies in a rural school district and a rural township. The fieldworkers rigorously evaluated the health and living conditions of rural families, particularly children's physical and mental development. They visited rural schools, checking water supplies and school attendance. The sociologists found that some farm women had no pre-natal care unless there were complications, that most had their babies at home with doctors attending, and that mothers had very little post-natal rest before they resumed their duties. The report concluded that farm families saw childbearing as "a natural function that should normally be carried on with little curtailment of regular activities and with a minimum financial drain." Rural parents also believed that their children could not escape certain contagious diseases, and that it was best that they contracted them and developed immunity early in life.

Although the detailed study found some rural-urban differences, historian Pamela Riney-Kehrberg concludes that it "revealed that farm children in Iowa were relatively healthy. Mothers had fairly good maternity care, babies relatively high birth weight, and children exhibited normal levels of health and well being."

Sheppard-Towner federal funds dried up in 1929, when the act expired. The act had been intended to encourage the use of local resources, and mothers and babies with problems diagnosed at the clinics were directed to local doctors for treatment. Although many experts argued that the clinics were desperately needed, Lawrence writes, "by the middle of 1926, the tide had turned against federal involvement in state affairs. Medical opinion lashed out particularly against the [fed-

eral] Children's Bureau, which supervised the act, and its domination by lay people."

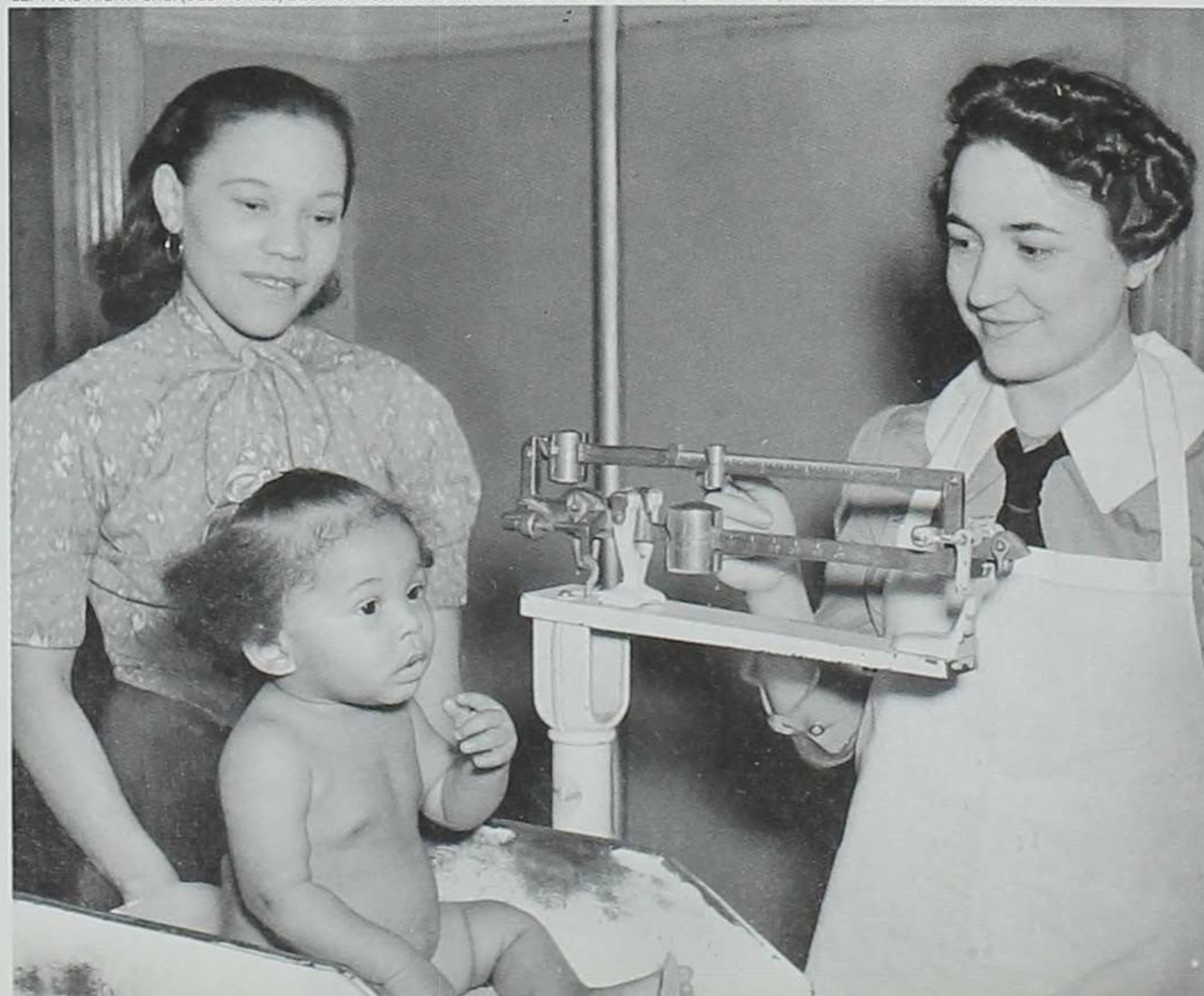
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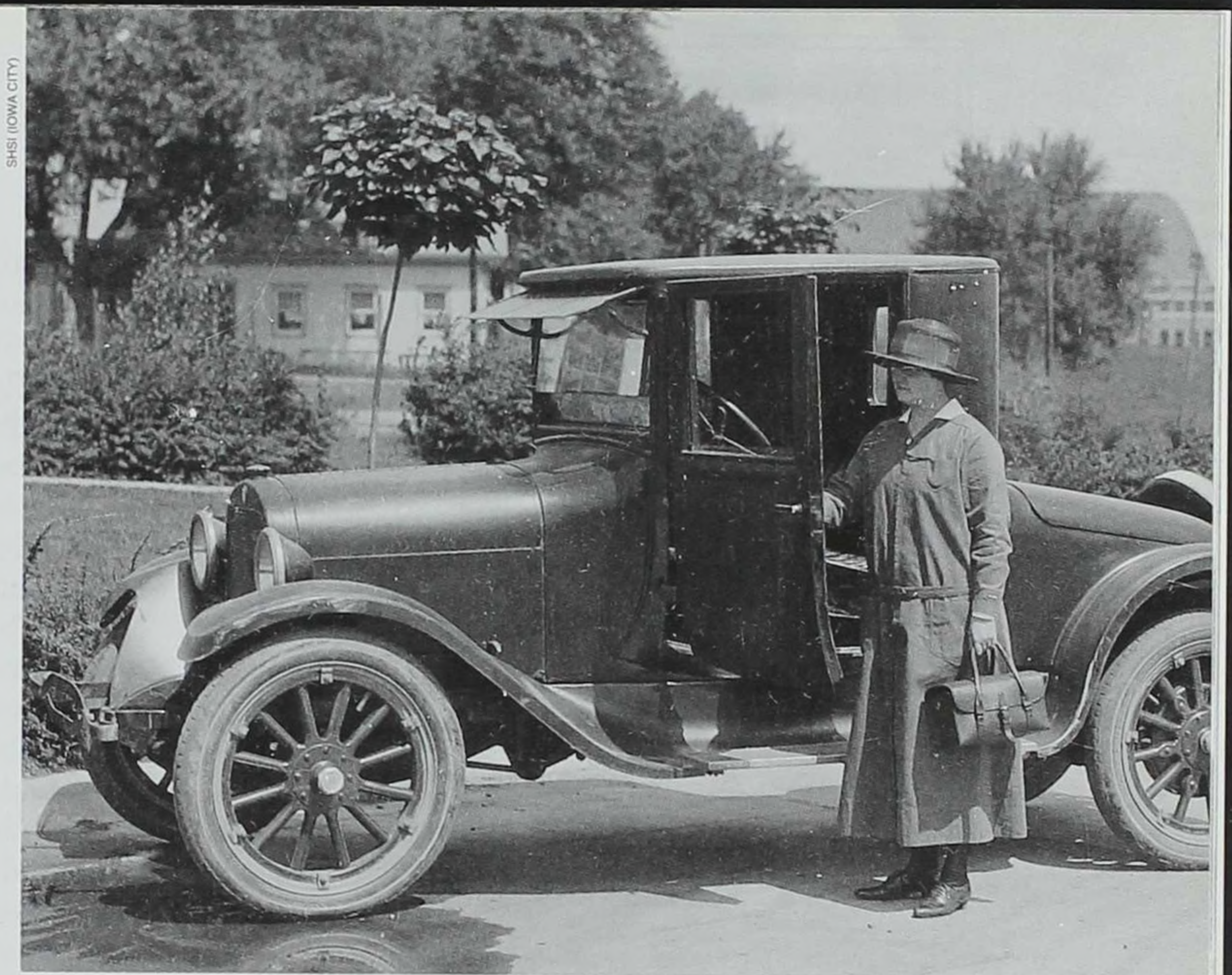
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HAVE YOU A RIGHT
to go to the marriage altar demanding
honor and purity in the girl you
marry, unless you are willing
to offer her
A Clean Life?

War Opens Up VD Discussion

by Ginalie Swaim

As the U.S. government geared up to fight the Hun, it also geared up to fight venereal disease. Starting in April 1917, the Wasserman blood test for syphilis was required of Iowans entering military service. The next year, two issues of the State Board of Health's *Health Bulletin* were devoted to VD, which, it reported, was on the rise in Des Moines and other Iowa cities. The bulletin spelled out what was expected. Health authorities must report all cases. Pharmacists selling VD drugs or compounds must make weekly reports of each customer's name, address, and sex to local health authorities. Those infected must restrict themselves from numerous kinds of contact. Blame was placed on prostitution. The bulletins made it clear that VD should not be considered a military problem but a civilian problem to be addressed in every Iowa community. In 1919, the State Board of Health received its first federal funds when the state passed a VD control act. Free clinics were set up in 12 cities. Educational materials directed to men and boys were placed in barbershops; small posters (see examples, this page) appeared in the *Health Bulletin*; an exhibit was set up at the state fair; and boys were reached via school lectures, film strips, pamphlets, and charts.

That same year, Jeannette Dean-Throckmorton joined the battle. Through a cooperative position with the United States Public Health Service, former physician Dean-Throckmorton became a State Board of Health lecturer. In three years, she delivered more than a thousand lectures on "social hygiene" to 185,000 women and girls—high school and college students, women's clubs, parent-teacher associations, and women in industry, business, and teaching.

Dean-Throckmorton's message was that VD "may attack [a mother] directly and ruin her health, wreck her happiness, rob her of the power to have children, or give her children that are blind, crippled or half-witted." Seldom had there been significant public discussion about syphilis, even though New York physician Prince Morrow had claimed in 1904 that one out of every seven marriages was childless because of VD.

Although Dean-Throckmorton maintained that sex education should also be taught in schools by trained teachers or motion pictures, mothers must stamp out children's vulgar and immoral thoughts and answer their questions frankly. "Women are the builders of the home and they naturally can touch upon sex matters with boys and girls with much better success than can men." "The majority of girls in this state receive no home instruction of any kind whatever on sex matters. It is doubtless the same with boys," she complained, determined to safeguard Iowa's youth during "the trying years of adolescence." ❖

The Venereal Diseases
A Sociologic Study
Iowa State Board of Health
BULLETIN No. 8

Come Clean!



Issued for the Provost Marshal General by the
 UNITED STATES PUBLIC HEALTH SERVICE

The Core of Public Health

Vital Records and Statistics

by Ronald D. Eckoff

Collecting vital records was one of the major responsibilities—and challenges—of the State Board of Health when it was established in 1880. Vital records (births, deaths, and marriages) would be tabulated and analyzed to identify problems and assess the effectiveness of sanitary and other preventive measures.

Some counties had started registering births in 1867 on the local level. But these reports tended to be incomplete and erratic, as were the local records submitted to the State Board of Health after 1880.

In the first years, many local health authorities did not report to the board. A Charles City doctor found the board's list of questions "exhaustive" and answered only a few. When compared to census figures, it was clear that only half of the Iowa deaths in 1880–1881 were reported to the State Board of Health. But eager to analyze the available numbers, and after an enormous amount of hand tabulation, the board published nearly 700 pages of tables and statistics in 1883. Because of uneven compliance, the statistics provided only a limited understanding of the prevailing fatal diseases in the state.

Optimistically, the Board of Health anticipated that reporting would rapidly improve with a little time and education. The board's 1917 quarterly bulletin reminded readers that birth certificates, which the Board of Health provided, were often needed for individuals to prove age, citizenship, and the rights to vote, hold public office, and inherit property. However, collecting records continued to be relatively unsatisfactory until the Iowa legislature passed the U.S. Census Bureau's Vital Records Model Registration Act in 1921.

As World War II approached, the demand for birth certificates exploded. In June 1940, the Department of Health employed 13 people to search records and make certified copies of birth certificates. Within six weeks, the staff was doubled. These 26 people were divided into three eight-hour shifts, providing proof of citizenship for all people who were born in Iowa. Meanwhile, the night shift worked on index-

ing the records from 1880 to 1921. The workload continued to increase until Pearl Harbor, when it tripled overnight. Many Iowans found they needed a birth certificate, including those who wanted to work in the war industries. Within two weeks, the incoming mail rose from 3,000 letters per week to 10,000. The staff of the Vital Statistics Section expanded to 100.

Working in the State Medical Library, Jeannette Dean-Throckmorton received a request in August 1941 from an Indianola woman whose daughter Nina now needed a birth certificate. Dean-Throckmorton, who may have delivered Nina in her early years as a country doctor in Chariton, sent the mother a sworn affidavit and instructed her to take it, "together with any newspaper clippings, school cards, Cradle Roll of your Church, Baby Book, etc. and go to the Courthouse in Indianola where they will tell you what to do to get a sworn birth certificate."

Dean-Throckmorton couldn't resist expressing her opinion (no doubt the opinion of many who worked in Vital Records) that "if the State of Iowa had had a law for birth registration thirty years ago, all this trouble and expense for you and for me would have been avoided."

The responsibilities and scope of activities of the Iowa Department of Public Health have expanded manifold over the past 125 years. However, vital records and statistics continue to be the core of public health, allowing the department to distill from massive amounts of data the course of diseases and the effectiveness of health measures. ❖

Ronald D. Eckoff retired in 2002 after 36 years at the Iowa Department of Public Health. He served as a division director, division medical director, and twice as acting department director. He is preparing a history of the Iowa State Board of Health/Iowa Department of Public Health and local public health in Iowa. Anyone with information or suggestions may contact him at Ronald D. Eckoff, 12534 SW Maffitt Lake Drive, Cumming, Iowa 50061, or by e-mail: reckoff@radiks.net.



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"It was terrible out there [at Camp Dodge in Des Moines]. That was one of the reasons why we were held up and they didn't send us overseas was because the flu was so terrible they were dying out there two or three hundred a day. They were hauling them in dray wagons down to the embalming station. They didn't have anything to put them in. They just wrapped them up in Army blankets and stacked them in the wagons, hauled them down to the mortuary where they put the bodies in rough boxes. They stacked the rough boxes outdoors. Oh, there was a row three wide, and about fifteen or sixteen long, and about eight or ten high."

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People and Pigs

Iowa's Role in 20th-Century Influenza History

by Russell W. Currier

In the mid-18th century, Italians who contracted the dreaded disease, usually in early winter, called it *influenza di freddo*—"influenced by the cold." With medical advances in the 20th century, our understanding of viral influenza has improved greatly. Many of these insights and advancements evolved from Iowa connections.

The defining event of influenza in all time occurred in the fall of 1918 with the appearance of a new strain of flu. Upwards of half the human population of the world were affected and mortality rates of 2 to 5 percent were common among the affected. The disease was so severe that some patients progressed from onset to death in less than two days' time. A *Des Moines Evening Tribune* headline for October 8 solemnly announced 36 deaths at Camp Dodge and 5,624 cases.

A week earlier, on September 30, the National Swine Show and Exposition in Cedar Rapids opened to large crowds. Within a few days some of the swine exhibited an illness that was being transmitted to other pigs. The swine show was closed early due to the infectiousness. J. S. Koen, a livestock inspector in the U.S. Bureau of Animal Industry from Fort Dodge, realized that the illness had never been seen before, and he observed that it was similar to human influenza, which was sweeping the globe. Koen proposed that they were the same illness and named this new disease "swine influenza."

Hog producers were sensitive to the term "swine influenza," since it might convey that pork was unhealthy. Nevertheless, Koen was adamant. "I have no apologies to offer for my diagnosis of 'flu,'" he wrote a year later. "Last winter and fall we were confronted with a new condition, if not a new disease. . . . The similarity of the epidemic among people and the epizootic [an



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People and Pigs

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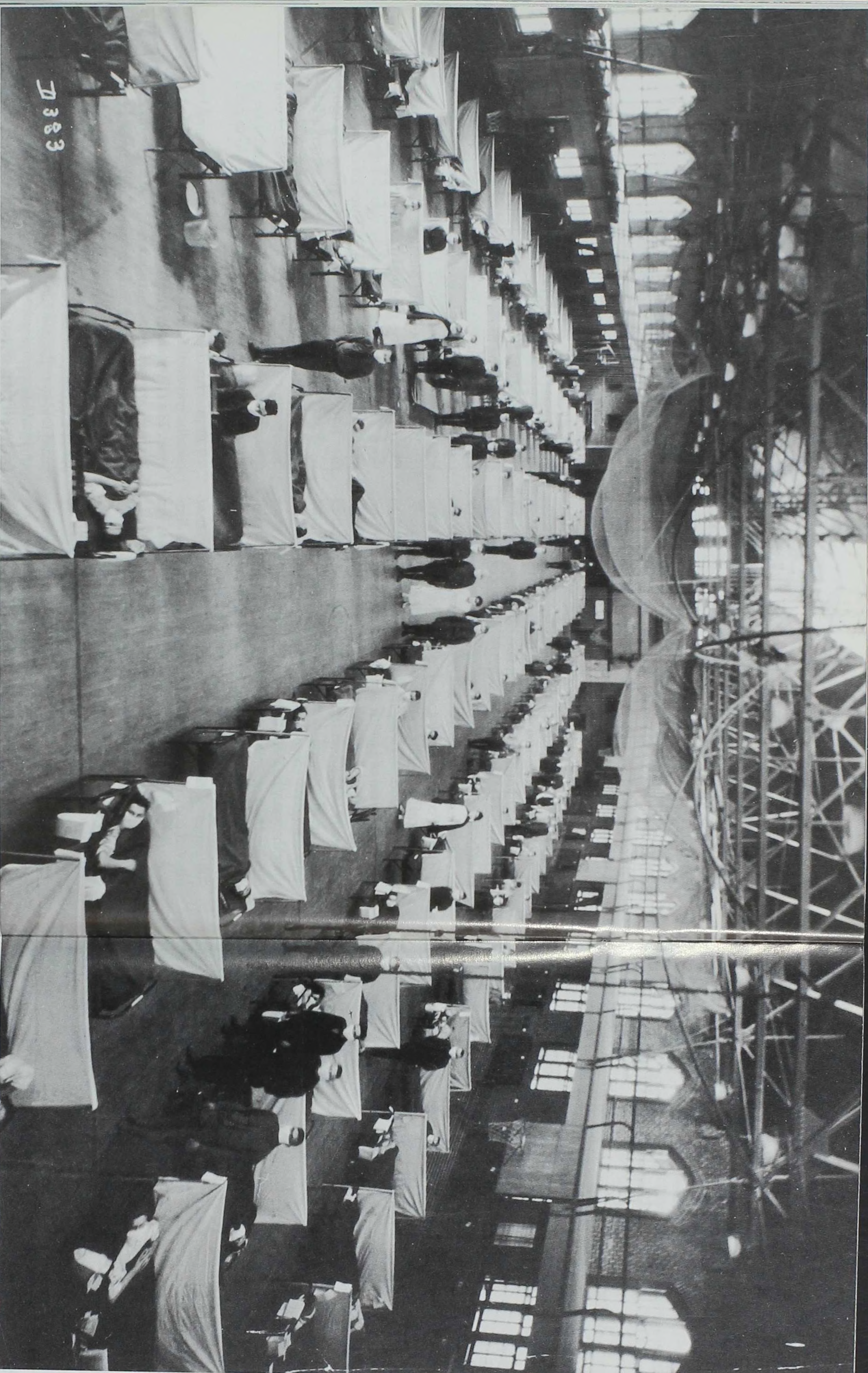
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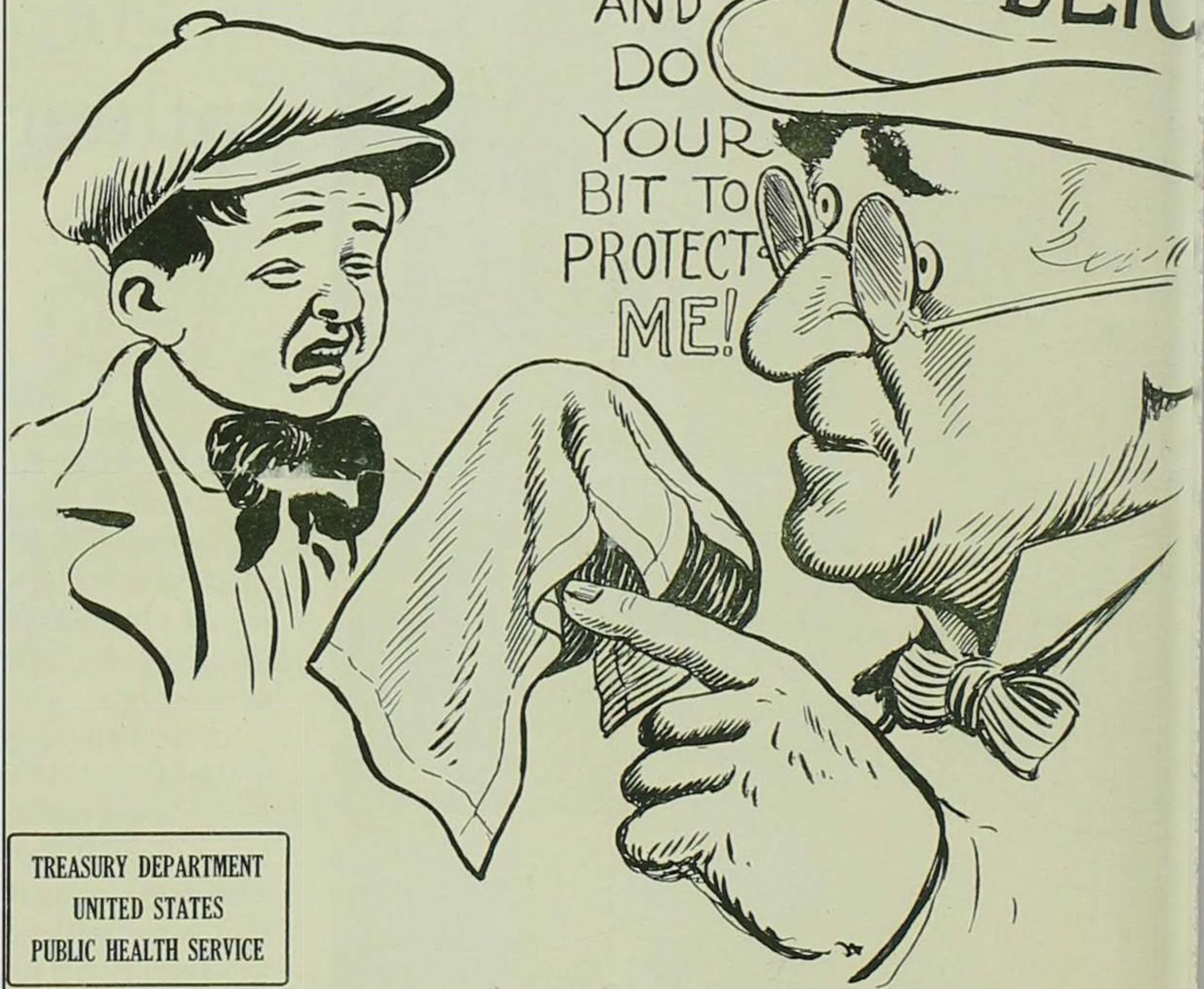
animal epidemic] among pigs was so close, the reports so frequent, that an outbreak among the hogs and vice versa, as to present a most striking coincidence, if not suggesting a close relation between the two conditions. It looked like 'flu,' it presented the identical symptoms of 'flu,' and until proved it was not 'flu,' I shall stand by that diagnosis." This new disease appeared in pigs annually after 1918.

Nine years later in 1927, an Iowa veterinarian with the U.S. Bureau of Animal Industry in Ames, C. N. McBryde, did field studies of swine influenza, noting the first symptoms as loss of appetite, "do not like to move," fever, a "thump or jerky respiration," and invariably a cough. Initially skeptical of Koen's linking of swine and human flu, McBryde later concurred when he suffered an influenza-like illness after extensive exposure to similarly affected swine. His illness was characterized by loss of appetite, slight fever, "aching in the back and joints," and a cough resembling whooping cough. "The cough was not troublesome at night, nor when resting quietly," he observed, "but the paroxysms seemed to be brought on by exertion and, in this respect, was quite similar in nature to the cough which is one of the characteristic symptoms of hog flu. This indisposition was so entirely different from the usual run of colds and was so similar in its sudden onset and in some of its symptoms to swine flu, that the writer has rather inclined to think it must have been a respiratory infection acquired as a result of breathing the dusty atmosphere of the hog barns occupied by swine suffering from acute hog flu."

Another Iowan, a young physician, read Koen's papers and was intrigued. A graduate from the State University of Iowa College of Medicine, Richard Shope

**USE
THE HANDKERCHIEF
AND DO
YOUR
BIT TO
PROTECT
ME!**

**THE
PUBLIC**



TREASURY DEPARTMENT
UNITED STATES
PUBLIC HEALTH SERVICE

**COLDS, INFLUENZA, PNEUMONIA, AND
TUBERCULOSIS ARE SPREAD THIS WAY**

Poster Series No. 2.

GOVERNMENT PRINTING OFFICE

Public health departments reminded Americans that such simple measures as using a handkerchief helped prevent the spread of influenza and other diseases. Researching the various strains and producing vaccines is far more complex.

taught pharmacology at the university before being recruited by the Rockefeller Institute at Princeton, where he worked on treatment of human tuberculosis. Shope was dispatched back to Iowa in the fall of 1928 to do field studies on hog cholera, a serious disease of pigs at this time. On this trip he observed swine influenza in Iowa.

"In the summer of 1928," Shope recounted, "I was in Iowa doing blood counts in hog cholera and other

swine disease with the cooperation of a number of veterinarians in eastern Iowa. During this time I had occasion to go to Ames to see Dr. Charles Murray and it was he who first called my attention to the existence of swine influenza. Returning to eastern Iowa, arrangements were made with Dr. Fred Crow for the collection of material from typical cases when the epizootic should appear during the autumn. Dr. Crow telegraphed me on November 13 saying, 'Plenty of hog flu—come at once.' I took the first train west, and on arriving in Iowa City found that there was indeed plenty of 'hog flu.' Through the friendliness and cooperation of a number of eastern Iowa veterinarians and their clients, many swine autopsies were obtained and material from the best cases was shipped back to Princeton. At that time, because we had no idea as to how fragile or easily killed the causative agent might be, we packed our infectious material in iced thermos jugs and sent it by air mail from Cedar Rapids. After several unsuccessful attempts to establish swine influenza in our experimental pigs in Princeton with the various samples sent, one batch finally 'took.' This had been obtained by Dr. Crow on the Probst Brothers' farm near Iowa City. Dr. Lewis, my chief, wired me of his success in establishing the disease experimentally and to return to Princeton as soon as possible."

Shope also recovered a bacterium from pigs with flu that closely resembled a comparable microorganism (Pfeiffer's bacillus) isolated from patients with influenza. This bacterium had been associated with a number of human influenza cases in the fall of 1918; many considered it the cause of influenza.

Later in 1931, Shope conclusively demonstrated the presence of a new virus that was important in causing swine influenza. He later recommended that British scientist Christopher Andrewes (who was working on human influenza) should test ferrets, which can be highly susceptible to human influenza virus. Andrewes and his colleagues subsequently established that a virus caused human influenza. Shope's research on swine influenza set the protocols for subsequent human flu studies.

Shope also looked back to the 1918 flu epidemic. The earlier and smaller wave of the flu in the spring of 1918 was less severe and seemingly conferred immunity to the more lethal strain in the fall. Shope noted in a 1958 lecture that "the 2nd Infantry Regiment . . . underwent influenza in June of 1918 in Hawaii before being transferred to Camp Dodge [in Des Moines] about August 1. When the severe second wave hit Camp Dodge in September and October, the 2nd Regiment was only slightly affected, although the attack rate for the

camp as a whole was about 33 percent and the case fatality [rate] 6.8 percent."

In 1949 Swedish graduate student Johan Hultin and his wife, Gunvor, were on their way to the State University of Iowa, where Hultin would conduct research on the influenza virus. After hearing an off-hand remark by scientist William Hale suggesting that the 1918 flu virus might be recovered from flu victims buried in permafrost (freezing preserves virus), Hultin proposed an expedition to Alaska to locate native villages decimated by the 1918 influenza pandemic and to exhume victims who were buried in permafrost.

The goal was to recover the original strain of the 1918 virus for study and possible use as seed virus for vaccine production. In June 1951, Hultin, with University of Iowa virologist Albert McKee and pathologist Jack Layton, departed for Fairbanks. They would meet up with Otto Geist, a German paleontologist who was familiar with areas affected by the flu.

There was a sense of urgency and competition. The U.S. Army, with elaborate funding and technical support from the National Institutes of Health, was organizing a major expedition to accomplish a similar scenario, using Hultin's information submitted as part of a funding request.

Several days of continuous rain delayed Hultin's flight to the villages of Wales and Brevig. Eventually the rain stopped and a bush pilot flew him in to Wales, where 178 of 396 residents had died from the 1918 influenza within a few weeks. The grave site was no longer in permafrost owing to beach erosion. Next Hultin flew to Brevig, where 72 of 80 people died of flu in November 1918. The bodies had been stored above ground for two months until Alaska territorial authorities contracted with a gold-mining company to excavate a burial site six feet below the surface.

Hultin met with village leaders and missionaries to explain the need and potential good of exhumation and collection of tissues. After permission was granted, Hultin worked 16 to 18 hours a day to slowly remove the frozen soil. He then sent for McKee and Layton to help collect tissue.

Because the team's dry ice for preserving specimens had evaporated early on the trip, Hultin appropriated fire extinguishers. The white cloud sprayed from fire extinguishers was in fact powdered dry ice; they quickly filled thermos containers with it.

After restoring the grave site, Hultin, McKee, and Layton flew back to Iowa, making numerous stops to recharge their specimen containers with more dry ice

from fire extinguishers. Back in Iowa City, Hultin started the exciting work of trying to grow virus in the embryos of fertile chicken eggs. Nothing grew. Next he injected tissue suspensions into the nostrils of guinea pigs, ferrets, and white mice. After several attempts, no viable virus was recovered and all the tissue specimens were exhausted. The larger, well-funded U.S. Army expedition to exhume corpses had also failed.

Hultin set his work aside, completed his medical education at Iowa, and moved to California. He thought he was through with his Alaska expeditions.

After about 1920, influenza activity had returned to its pre-1918 character: it consistently appeared in the late fall and early winter and had a low mortality rate. Then, in the spring of 1957, a major shift was detected. The Walter Reed Army Institute identified influenza viruses from Hong Kong cases that were distinctly different from earlier strains. In June sporadic cases were identified on both the East and West Coast of the United States. The race was on to produce an "Asian flu" vaccine in time for peak flu season, December through February. Unfortunately, "seeding" (the initial spread of the virus) had already occurred, in Grinnell, Iowa.

Beginning on June 29, Grinnell College hosted a six-day Presbyterian youth conference with 1,680 delegates from more than 40 states and 10 foreign countries. Among the 100-plus California delegates was one youth who had been infected at an earlier state conference in Davis, California. In turn, substantial numbers of the other attendees at the Grinnell conference fell ill (many were hospitalized), prompting officials to close the meeting early and send the delegates home.

No doubt these cases then transmitted the flu to Boy Scouts in several different locales, who subsequently assembled July 11-18 in Valley Forge, Pennsylvania. At the jamboree, 53,000 Boy Scouts were encamped, creating optimal conditions for exposure to the new strain of influenza. In August, the first community-wide outbreaks occurred in Louisiana and Mississippi. The numbers escalated in October and peaked in early November, very comparable to the 1918 epidemic. The vaccine could not be administered in time to interdict the new virus and its trail of illness.

In January 1976, an army recruit at Ft. Dix, New Jersey, collapsed during a field march and died shortly after. Other soldiers came down with the same illness. The New Jersey State Health Laboratory isolated

an influenza virus; other labs identified it as a strain of swine flu type influenza. In closed-door meetings, the Center for Disease Control (CDC) in Atlanta assessed the situation and then informed the media and the nation. Scientists and high-level federal officials decided on a controversial crash program of vaccine production followed by mass administration. Developing a vaccine got under way.

Meanwhile, public health professionals were searching for swine flu activity and possible seeding of the virus, as had occurred in the late spring and summer of 1918, and again in 1957. In April, CDC director David Sencer asked me to investigate a possible earlier swine flu infection of a Kellogg, Iowa, family whose son was among the ill at Ft. Dix. The young man had worked on a swine farm in Arkansas; while home for the holidays in late December 1975, he had decided to quit his farm job and enlist in the army. Unfortunately neither health history nor laboratory tests on the family members' blood corroborated a recent infection with swine influenza virus. Efforts in other states also failed to identify any swine flu activity excepting the predictable infection in pigs.

In August, the vaccine producers refused to release the vaccine unless the federal government assumed liability for any side effects; the producers' insurance carriers reasoned that an entirely new virus system posed too much risk for standard insurance coverage. As this was being debated, an outbreak of pneumonia at an American Legion convention in Philadelphia dominated national news; some speculated that swine influenza had arrived, prompting the U.S. Congress to hastily pass legislation for the federal government to assume liability for untoward effects of the vaccine.

The vaccination program cost \$135 million. In Iowa, 1,030,000 were vaccinated in less than two months, and before the usual flu season. But swine flu was not demonstrated anywhere nationally or globally, and the Philadelphia episode turned out to be a new bacterial disease called "Legionnaires disease." Unfortunately, too, some swine flu vaccine recipients (including some Iowans) developed Guillain-Barré Syndrome. This condition, usually developing a few weeks after a viral infection, is a distressing, flaccid paralysis of the lower body that ascends upward to the chest and arms. In some cases it requires several weeks for recovery and sometimes may be fatal.

For the past 36 years, with varying degrees of small changes or "drift," Hong Kong influenza has affected the human population. It originated in China and a pandemic followed in 1968. Like the 1918 Spanish flu virus, the Hong Kong flu virus has now entered swine

and was first detected in 1998 in North Carolina feeder pigs relocated to Iowa farms. The significance of this is that pigs can serve as a "mixing vessel," reassort viral components from humans and birds, and in turn shed a new virus potentially infecting humans. Presently the CDC is conducting surveillance studies in Iowa on swine farm workers, their families, and their hogs to monitor influenza activity and search for "recombinant" strains of flu virus that essentially represent hybrids of human, swine, and avian components.

The 1918 influenza outbreak, with its high attack rate and serious mortality levels, has continued to concern researchers. In 1997, Jeffrey Taubenberger and Ann Reid, at the Armed Forces Institute of Pathology, partially reconstructed the viral genome of the 1918 virus from archived tissue samples (preserved in formalin and sealed in wax) collected from deceased military victims in the pandemic.

Enjoying retirement in San Francisco, 72-year-old Johan Hultin read their progress reports. With modern virological techniques in mind, Hultin wrote to Taubenberger about repeating his 1951 expedition to Alaska. Taubenberger said he would welcome submission of specimens but had no funds for an expedition. Hultin called his travel agent; he would pay for it himself.

In August, permission was granted to again open the burial site in Brevig, Alaska. Hultin uncovered the remains of the eleventh body in the mass grave. "I sat on a pail—turned upside down—and looked at her," Hultin said. "Then I saw it. She was an obese woman; she had fat in her skin and around her organs and that served as a protection from the occasional short-term thawing of permafrost. Those on either side of her were not obese and they had decayed. I sat on the pail and saw this woman in a state of good preservation. And I knew that this was where the virus has got to come from, shedding light on the mysteries of 1918. I gave her a name. Lucy. I also thought of Lucy, *lux*, Latin for light. She would help Taubenberger shed light on that pandemic." Hultin constructed two new wooden crosses to replace the weathered crosses that had marked the burial site.

From Lucy's tissues, Taubenberger and Reid secured RNA from the virus, albeit inactivated but well-preserved enough to permit continuing study on the genome. How important is sequencing the genome from tissue of 1918 flu victims? First, the 1918 virus can be compared with other strains, and help establish evolutionary patterns in avian-like or mammalian-like strains. Second, sequencing enables "reverse engineering" of flu

and fabrication of new versions of flu virus. Researchers can learn how these viruses infect cells and sabotage the host's immune response as well as help develop prototypes for new vaccines. Without this capacity, detection and prevention of the next pandemic flu virus strain would be difficult, if not impossible.

Epidemiologists and medical historians have not set aside their anxieties over influenza. A brief scare occurred in April 2005. Authorities discovered that blind samples of flu virus, distributed to laboratories for testing staff proficiencies in identifying different strains, had accidentally included the 1957 influenza strain that dramatically affected a conference at Grinnell College that summer. This flu strain has not circulated since 1967; all persons born since that year would have been susceptible. Fortunately the error was detected and samples distributed earlier—including some in Iowa—were destroyed before infecting laboratory staffs, with subsequent spread to communities.

Since 1998, after eight decades of only classical swine influenza (H1N1) activity in pigs, two additional new strains of human influenza virus (H3N2) have been demonstrated in Iowa pigs. This observation coupled with the increased activity of avian influenza in Southeast Asia result in conditions that may enable reassortment of new strains of human influenza virus. Fifty human deaths were recorded from the most recent Asian outbreak (January 2004–April 2005).

Given that the world has not had a major "shift" since 1968, it would appear that a shift is due to occur, if not overdue. The increased sporadic cases of avian influenza virus in humans and the expansion of influenza strains now routinely found in pigs are worrisome indeed. Perhaps another Iowa scientist, or another recognition of early flu activity in Iowa, will provide vital insights and establish protocols to identify and interdict the next pandemic. ♦

Russell W. Currier served as the public health veterinarian at the Iowa Department of Public Health from 1975 to 2004, after six years with the Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia. He resides in Des Moines and has an avocational interest in medical health history.

Nothing Much You Can Do Polio in Iowa

by Ginalie Swaim

How is the polio scare out there? There are 7 cases in Campustown I hear and two brothers 4 yrs & 2 yrs across the street from us have it, but so far none of the other kids around here have it. Nothing much you can do except watch them."

From her home in Ames in 1949, 26-year-old Barbara Burrell Nichols also shared other news with her relatives in that late summer letter: throwing a birthday party for her eight-year-old Stevie, painting the porch, sewing a pair of pajamas, keeping her toddler Gail out of mischief. Nichols's letter on Tuesday, September 6, mentioned all the fruit she had canned but not the stiff neck and headache she'd had on Monday. On Thursday doctors put the young mother in an iron lung. On Friday she died.

In Mapleton, in 1952, 11 of the 14 children in the

Thiel family fell ill with polio. Two remained paralyzed.

Polio was no stranger to Iowa. As early as 1910, records show 186 cases that year. After public health inspectors investigated 59 cases in Cerro Gordo County, the State Board of Health required that all cases be reported, and recommended quarantine and sanitary measures.

Most often striking children, the poliomyelitis virus attacks nervous systems and impairs muscle groups, sometimes causing temporary paralysis. One percent experience paralytic polio with severe and lasting effects.

Polio reoccurred every few years in Iowa, but in 1940, the number of cases skyrocketed to 927. The period 1948-1950 averaged 1,300 cases yearly, peaking at more than 3,500 in 1952. A quarter of them were in Sioux City. A gamma globulin vaccine was tested on 16,500

September 1937: Walter Biering, Iowa Health Commissioner, and Florence Wesslund, superintendent at Iowa Methodist Hospital, read the directions for an iron lung just received.



ALL THREE PHOTOS: SHSI (DES MOINES) DES MOINES REGISTER AND TRIBUNE



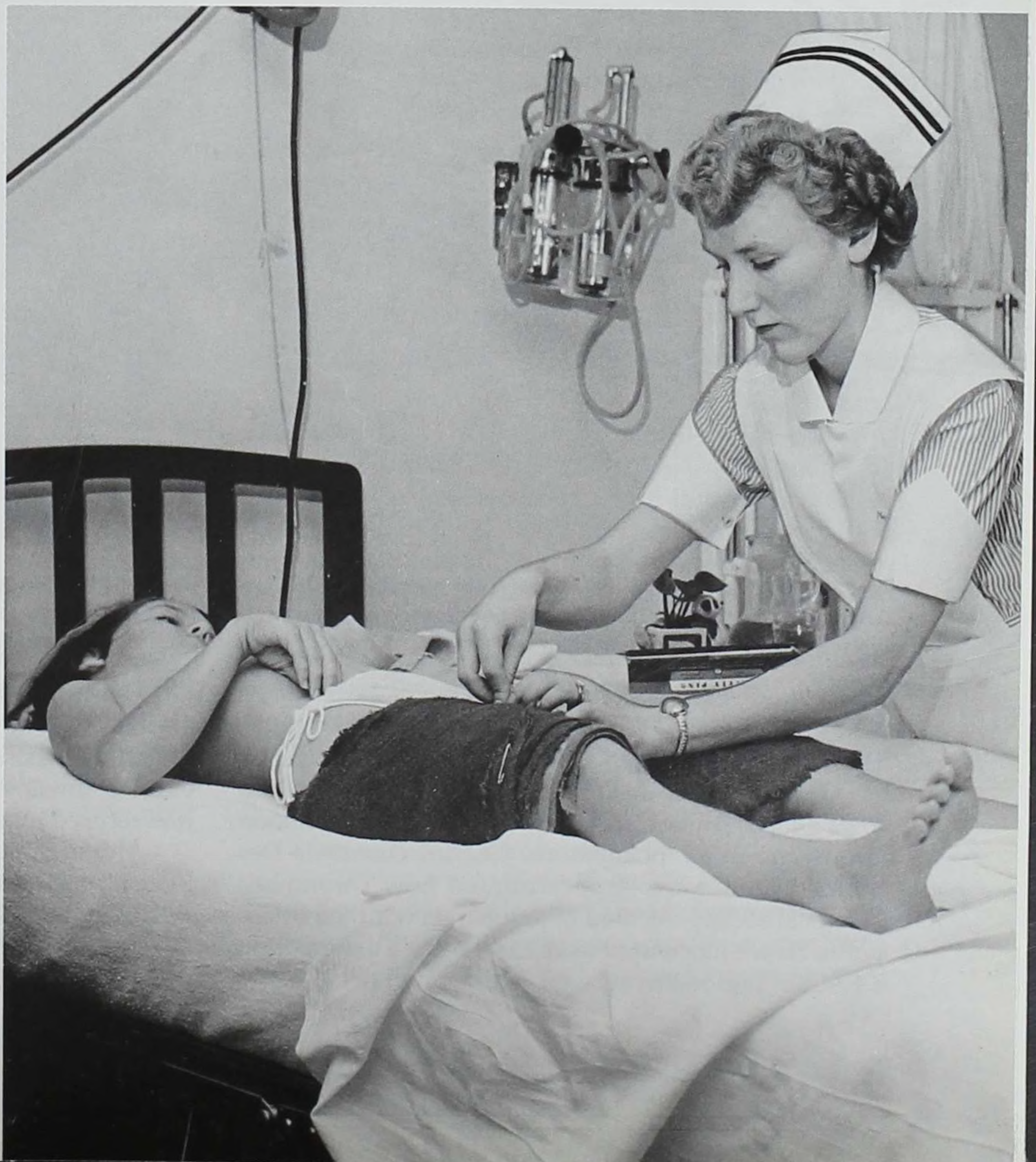
August 1948: At the Fort Des Moines housing project, F. E. Black sprays garbage cans for flies, in the hopes of stopping the spread of polio.

September 1952: Broadlawns Hospital student nurse Anna Burr Getzoff applies a hot pack on a polio patient to help relax and recondition constricted muscles, a treatment pioneered by an Australian nurse, Sister Elizabeth Kenny.

children in Sioux City and the surrounding Woodbury County and in Dakota County in Nebraska, part of a national trial, but the vaccine gave only short-term protection. Iron lungs were flown to Sioux City to assist those whose breathing muscles were impaired, by compressing and expanding the chest, pushing air out and pulling it in.

With no known cure and no way to prevent it, polio terrified most Americans—but not Gladys Talcott Rife, a young mother and farm woman in eastern Iowa, who contracted polio in 1948. In her weekly newspaper column, she wrote appreciatively of hospital nurses, comically of doing housework on crutches, and rationally about the “mass hysteria” polio had caused in the nation. “Keep up the research, yes; keep up the provisions for proper care, yes; but keep up the unreasoning fear, No!”

Hope finally eroded fear when the new Salk vaccine trial was tested successfully on 420,000 children in 1954. A placebo was given to another 200,000, and 1.2 million were observed. In Woodbury, Linn, and





SHSI (DES MOINES) DES MOINES REGISTER AND TRIBUNE

As 923 polio patients flooded Sioux City hospitals in 1952, the Missouri River flooded its banks, adding to public health challenges for river towns. Sandbags (above) were one way to fight the floodwaters, and vaccine clinics protected citizens from typhoid fever, once a major killer in Iowa. Some feared that the flood would spread polio, already raging in Sioux City.

Scott counties, 13,000 children were part of the trial. The next year the Salk vaccine was available to the public. The Sabin vaccine replaced it in 1962.

Organizations, including the March of Dimes and Iowa's labor unions, assisted with public information efforts and mass inoculations. Charles Harvey, a Des Moines laundry worker, recounted how Dubuque's "medical society decided to join hands with the osteopaths. So we inoculated over 7,000 people there within a 15-hour period, because we had enough doctors."

The number of cases in Iowa plummeted—from 1,445 in 1954, to 580 in 1956, then to only 78 in 1957. In 1979, however, an outbreak occurred in four states, including Iowa, where the Amish in Buchanan County had refused inoculation.

Although polio has been vanquished in the United States, post-polio syndrome began to appear among former polio patients in the 1980s. For the last two decades, international efforts have focused on eradicating polio throughout the world. ❖

Fluoridation in Iowa

by William C. Maurer

Prior to our country's entry into World War II, nearly 9 percent of inductees had lost so many teeth from tooth decay that they were rejected for general service due to failure to meet dental standards. After Pearl Harbor, dental standards had to be relaxed in order to meet the manpower requirements for such a large war effort. Since that time, dramatic improvements in our nation's oral health have occurred due to greater emphasis on preventive dentistry and early detection and treatment of dental disease. Most significant has been the widespread adoption of community water fluoridation.

In the early 1900s, Frederick S. McKay, a dentist in Colorado Springs, Colorado, became interested in the number of his patients whose teeth had brown staining. Through his efforts and the assistance of dental researchers, the cause of "Colorado Brown Stain" or mottling (enamel fluorosis) was found to be due to the town's drinking water, which contained two parts per million (p.p.m.) of fluoride. This problem was not unique to Colorado; surveys at other U.S. sites (including in Iowa) had found water supplies causing this brown staining as well.

Fluoride, the 13th most abundant element on earth, naturally occurs in virtually all water although most water supplies have low or only trace amounts. However, it is not uncommon for ground water supplies (wells and springs) to contain significant levels, due to fluoride-bearing minerals in the aquifer. A survey of Iowa's public water supplies in 1933 found 51 cities with 2 or more p.p.m. fluoride; nearly 100 percent of Ankeny schoolchildren had dental fluorosis because of drinking water with 9 p.p.m. of naturally occurring fluoride. There is a wide distribution of Iowa communities with 1.0 p.p.m. fluoride or higher, but the greatest number are in the central and southeast areas.

By the 1930s researchers found that the brown staining was proportional to the water fluoride content, but that tooth decay was inversely proportional. More significantly, they determined that the optimum level for



Before fluoridation, tooth decay and extraction were common.

fluoride when tooth decay was low and tooth staining was absent was 1.0 p.p.m.

In January 1945, Grand Rapids, Michigan, made history when it became the first city to initiate water fluoridation. It had been chosen by the United States Public Health Service to conduct a trial to determine if the benefits of naturally fluoridated water supplies could be duplicated by fluoridating a community water supply. This was accomplished by adjusting the fluoride content of its water supply through the addition of sodium fluoride in the water treatment plant. During the same year Newburgh, New York, began a similar fluoridation study.

The first results of the Grand Rapids trial reported in 1950 showed significant reductions in tooth decay compared to children in Muskegon, Michigan, the control city. After 11 years of fluoridation, Grand Rapids showed a 60–65 percent tooth decay reduction in children born after the start of fluoridation and significant reduction in the number of missing permanent teeth. The Newburgh study had similar results.

In Iowa, Waukon and Dubuque became the first cities to adopt fluoridation, in October 1951, followed by Cedar Rapids the next year. By 1966, with half of its population on adjusted or natural fluoridation, Iowa ranked sixth in the nation in percentage of population with access to community water fluoridation. This included more than 170 Iowa communities with naturally fluoridated water.

By this time most large cities in Iowa had initiated water fluoridation, but very few towns below 5,000 population. Over the next 26 years an additional 148 communities and 9 rural water systems (serving more than 346,000 Iowans) initiated water fluoridation with the assistance of state and federal grants for equipment.

Researchers initially believed that lifelong benefits of fluoridation were obtained during a child's first 12 to 14 years of life. During these years, permanent teeth calcify and fluoride is incorporated into the crystalline structure of the tooth enamel, making it more resistant



A discussion of fluoridation packed a Des Moines city council meeting in March 1959. Right: An anti-fluoridation flier (undated).

PHOTO: SHS (DES MOINES) DES MOINES REGISTER AND TRIBUNE. FLIER: SHS (IOWA CITY)

DON'T BE FOOLED!

on Fluoridation FACTS

1. **POISON**—Sodium Fluoride is a Poison. It is used to kill rats and insects.
2. **DANGEROUS** if taken internally or inhaled. Dr. Leo Spira, M.D., New York, says: "It deprives the body of Calcium. Heart, diabetic and kidney patients are warned NOT to drink fluoridated water."
3. **CANCER**: "The results of my experiment indicate that animals on treated (fluoridated water) developed cancer earlier than the controls—(those not drinking fluoridated water!)"—from a letter by Dr. Alfred Taylor, research scientist, in the Biochemical Institute, University of Texas.
4. **SMALL DOSAGE HIGHLY TOXIC**: "Fluoride intoxication is insidious and ACCUMULATIVE, especially when the daily dose is small, but its effects are permanent and irreparable," says Dr. Charles Dillon.
5. **FLUORIDATION IS A DANGEROUS AND UNSCIENTIFIC EXPERIMENT**: "It is unscientific and impractical to prescribe a toxic substance for the duration of your life, as an experiment, whether we need it or not, against our will, and without being able to stop taking it if we want to do so," says Dr. C. A. Brusck, M. D., of Cambridge Medical Centre, Mass.
6. **FLUORIDATION** is the experimental MASS-MEDICATION of entire populations by the impregnation of entire water supplies of whole communities with METALLIC fluorine compounds INCAPABLE of being assimilated as food, under conditions of duress, without cession or reasonable chance of escape." (Dr. Paul Manning).
7. **FANTASTIC WASTE OF TAXPAYERS MONEY**: Over 8 million gallons of water pumped yearly by Des Moines Water Works—would take \$17,638 for the chemical only if put in city water—per year. Yet only \$25.00 of same chemical (sodium-fluoride) actually needed for 60,000 children in Des Moines—if tablets were sold by drug stores.

That is \$17,613 of taxpayers money WASTED. That wasted money should be used for salaries—NOT to buy poison to put in our drinking water.

Citizens Committee Opposing Fluoridation
2826 Logan
Des Moines, Iowa

to tooth decay. More recently, researchers have agreed that an additional benefit of fluoridation, and the most significant, is the remineralization (or hardening) of tooth enamel after bacterial plaque acid attacks. Thus, adults as well as children benefit from fluoridation.

While the fluoridation trials of the 1950s resulted in 60–65 percent reduction in tooth decay, benefits now range from 18 to 25 percent. Fluoridation is still effective, but people living in non-fluoridated communities receive significant benefits of fluoride through the consumption of beverages and other foods processed in fluoridated communities. For that reason the relative benefits of community water fluoridation are no longer as great as they were in 1945 because there are truly no communities that are considered to be fluoride free.

Public support of fluoridation has led to the large number of city councils that have authorized fluoridation. Far less visible are the ongoing skills of water plant operators to monitor and adjust fluoridation equipment. But success has not come without opposition.

Over the past six decades, various groups of anti-fluoridationists have produced literature (and now Web sites) making allegations about the hazards, ineffectiveness, conspiracies, and illegality of fluoridation. These materials are frequently made available to city councils when the adoption of fluoridation is being considered. This literature has often used half-truths, lies, and findings from various legitimate scientific articles taken out

of context to make their claims. One of the earliest was that sodium fluoride, a rat poison, was being put into drinking water. This ignored the issue of dosage, which at optimal fluoridation levels is only 1 p.p.m. (equal to one drop of water in a bathtub full). Fluoridation at one time was claimed to be a communist plot to weaken U.S. citizens for an overthrow. Some believe fluoridation infringes on their rights of freedom of choice.

Opposition continues, even though more than 70 percent of Americans support fluoridation, according to public opinion surveys. Fluoridation is cost effective: every dollar spent on fluoridation saves \$80 in dental treatment. Extensive peer-reviewed research over the last half century documents its continued benefits and safety.

At present nine out of ten Iowans, and two thirds of the U.S. population on public water supplies, have access to this proven public health measure. Nearly a hundred national and international organizations recognize fluoridation of community water as an effective means of preventing tooth decay. ❖

William C. Maurer was Chief of the Dental Health Bureau, Division of Family and Community Health, Iowa Department of Public Health from 1976 to 1999. He directed organized community activities towards prevention and control of oral disease, which included promotion of community water fluoridation.

The Evolving Case against Smoking

Lapse of Morals to Hazard to Health

by Ronald D. Eckoff

Cigarette smoking is comparatively a recent habit in the United States, being introduced in the early [1870s]," explained J. M. Emmert, a doctor in Atlantic, Iowa, in the 1895 State Board of Health report. "Like many other crimes and filthy habits, it originated among the lower classes of Russia, Poland, and France, and for a long time was confined to the same classes in this country [and now is] adopted by the better class. . . . One of the most dangerous, degrading and demoralizing evils, [it] demands the early attention of our legislators." If the U.S. government could not outlaw cigarette manufacture and sales, he railed, then "states should protect their young men and boys by enacting prohibitory laws. This is easier said than done, for there is an immense amount of money and influence that will be used freely to cripple or arrest any effort. . . . The Cigarette Trust has had lobbyists in swarms to buy, threaten and browbeat every officer who dared raise a voice against their nefarious business."

Emmert was not done. He had been told that many cigarettes "contain material from old cigar stumps and quids of tobacco culled from the gutters and sidewalks and cuspidors." Most were "impregnated with opium, arsenic, cocaine or some other enslaving drug." Smoking affected internal organs and the nervous system (leading to insanity, epilepsy, or suicide). "The boy who smokes soon falls behind . . . ; his memory becomes impaired; his brain dull and sluggish." He becomes "a street loafer or . . . a criminal, pauper or idiot, . . . a menace to society and a burden to the state." Girls, too, Emmert noted, were smoking and likely to become addicted.

U.S. sale of cigarettes had catapulted from 1.5 million in 1869 to more than 4.5 billion in 1896,

passing cigar sales. As historian Lee Anderson points out, "The Iowa legislature, in fact, prohibited the manufacture and sale of cigarettes in the state. On the other hand, few respectable Iowans would condemn the enjoyment of fine cigars by bankers, lawyers, and other solid, middle-class males. With issues of class, ethnicity, age, and gender so obviously underlying concerns about tobacco use, the chief objectionable effects of tobacco were behavioral rather than physiological."

In the 1903 report, a doctor connected smoking and alcohol. "I have never known a confirmed inebriate that was not, or had not been, addicted to the use of tobacco." A 1906 reprinted article cited smoking's addictive nature and its "blasting and blighting effect . . . because it draws off energy, saps the vitality . . . blunts the sensibilities . . . and kills ambition."

Attacking cigarette smoking as an issue of morality and character was not unique to Iowa health professionals in the late 19th and early 20th century. The connection to specific health problems took longer to firmly

establish in the minds of the medical world (not until the 1950s), and then in the minds of the American public (when warning labels were required on cigarette packages, and television advertising was banned). Today anti-smoking campaigns also aim to educate individuals about choosing healthy behaviors and making lifestyle changes. ❖

Ronald D. Eckoff served 36 years at the Iowa Department of Public Health, as a division director, division medical director, and twice as acting department director. He is preparing a history of state and local public health and welcomes information or suggestions. Contact him at 12534 SW Maffitt Lake Drive, Cumming, Iowa 50061, or at reckoff@radiks.net.



SHS (IOWA CITY); JOAN LIFRING-ZUG COLLECTION

Saint Patterson and his Duck Soup

by *Tim Lane*

In the far reaches of our galaxy, former asteroid #2511 now soars as "Asteroid Patterson" in a dark, eternal, and silent tribute. On Earth, in a remote part of the Antarctic's Queen Maude Mountains, one peak now bears the Patterson name as well. Both are equally symbolic of the greatness—and the obscurity—of Clair Patterson, a man some consider the most influential geologist of the 20th century.

There are individuals in the history of science whose efforts have touched nearly all of us: Lister, Pasteur, Fleming, and Salk. Those luminaries can claim to have benefited millions; Clair Patterson's work benefited the health of every person now breathing on this planet—an amazing feat for a boy whose first science lab was on the banks of the Skunk River.

Patterson's early intellectual sparks were ignited and nurtured with a chemistry set in the basement of his family's home in Mitchellville, Iowa, a town, he later said, where "creativity is not to be trampled on just because it's divergent from ordinary views."

Patterson's ascent was meteoric. He graduated from Grinnell College in 1943, after blowing up part of the chemistry lab, and then earned a master's degree in nine months at the University of Iowa. During World War II, he did atomic-emission spectroscopy for the Manhattan Project. He received his Ph.D. in chemistry from the University of Chicago in 1950, and then received a most intriguing offer to work in a totally different discipline.

Patterson was invited to determine the age of our planet, a problem that had long befuddled geologists. The invitation came from a fellow scientist and master fundraiser, Harrison Brown. Brown had a rough idea of how this could be done and had secured grants to do it, but he needed a capable chemist familiar with spectroscopy. Patterson was young, capable, and on a very short list of people qualified to do such work. In 1950 "mass spectroscopy experience" wasn't on too many resumé's. What Brown wanted Patterson to do was analyze the lead in ancient iron meteorites and rocks. He theorized that a dating system similar to what existed



Clair C. Patterson, 1922–1995

COURTESY OF THE ARCHIVES, CALIFORNIA INSTITUTE OF TECHNOLOGY

for carbon-14 could be created using lead. The carbon-14 dating system was only of use on objects less than 40,000 years old. Going from carbon to lead would be like trading in a ruler for a very long tape measure. Patterson proved to be the right choice even though he didn't know a thing about geology or mineral separations. "It'll be duck soup," Brown assured him. That soup took the better part of seven years to prepare.

The research was conducted at the University of Chicago and then Cal Tech. Fortunately, at both institutions Patterson was working in old, dirty buildings; he soon became aware that lead was omnipresent at substantial levels. He needed to measure incredibly minute amounts of lead to create his calculations, but massive amounts of environmental lead swamped the samples he wanted to analyze. It was like trying to hear someone whisper from ten rows away at a rock concert.

What Patterson did with this "problem" parallels what Sir Alexander Fleming did with the mold that appeared in his Petri dish, "ruining" his experiment by killing the bacteria. Patterson's observations later resulted in further research and eventually legislation that would be crucial to the air quality of the entire planet.

In pursuit of his duck soup, Patterson learned that most of the tens of thousands of statistics published about the lead content of common objects were wrong. Our atmosphere was far more contaminated than anyone knew. So before he could conduct his measurements, he first had to banish lead from his lab. No lead pipes, no water from lead pipes, no cans with solder, no food from cans with solder, no unfiltered air or lead paint. Patterson became obsessive in his efforts to eliminate every possible molecule of lead, including hitchhikers on skin, clothing, and every strand of hair. This process led to the creation of a state-of-the-art "clean" lab. The Patterson lab and his field procedures for procuring samples became the standard for all environmental efforts. The final step was a measurement taken at the Argonne National Laboratory in Illinois. Plugged into Patterson's formula, test results indicated that the earth

and thus the solar system were 4.55 billion years old.

Patterson's euphoria resulted in heart palpitations. He was so overwhelmed that he drove to Iowa and then checked into a hospital. Over the last half century this estimate has been scrutinized and has withstood the test of continued verification.

Patterson then turned his full attention to the lead that had pestered his initial studies. He calculated how much lead ancient Romans generated with their coin-manufacturing process. At one point he brewed a batch of sapa, the grape juice concentrate used by the ancients to control the fermentation of wine. The Roman recipe called for simmering the juice, herbs, and spices in a lead cauldron for days; the sweet taste of lead sweetened the sapa. He traveled to Antarctica to pioneer capturing clean core samples. Through all this Patterson collected more and more data on a clear, oily liquid called tetraethyl lead.

When it had been discovered in the 1920s that the tetraethyl lead additive could eliminate engine knock, there was a stampede to add it to gasoline. General Motors, Du Pont, and Standard Oil of New Jersey formed a joint enterprise called the Ethyl Corporation, which quickly became the tetraethyl lead provider to the world. What followed was an advertising campaign that spent millions linking lead with baseball, apple pie, and "the American Way of Life."

Although lead was widely known to be dangerous in the first half of the last century, it was still widely used. It was even sprayed onto fruit as a pesticide. Lead was easy to extract and work, and immensely profitable especially since it did stop engines from knocking. Until this time environmental lead was almost ubiquitous. After the Ethyl Corporation was launched in 1923, lead was ubiquitous.

Scientists knew that the tetraethyl lead additive was a neurotoxin and could damage the brain and central nervous system. Most conceded that overexposure could cause insomnia, blindness, cancer, kidney failure, hearing loss, palsies, and convulsions, and lead to death. But what wasn't clear was how much lead was getting into the ecosystem and at what point it would be dangerous. From the start, the Ethyl Corporation's own employees demonstrated symptoms associated with being poisoned. The corporation responded by embarking on a campaign that could easily be called a cover up to protect profits that grew from \$36 million to \$300 million in a decade. The resulting seven million tons of lead consumed in internal combustion engines increased human exposure by a factor of 300 to 500. The industry

maintained that lead was a natural part of our environment and any elevated levels were natural and not related to exhaust.

The ethyl conglomerate funded almost all the research about tetraethyl lead's effect on human health, research that conveniently focused on efficient production rather than on public health. Ironically, after Patterson had established the age of the solar system, the petroleum industry funded Patterson's research on lead, thinking it might help them locate oil fields.

That hope was to end soon, as Patterson's studies started to contradict the rosy picture drawn by corporate executives. He studied the bones of 1,600-year-old Peruvian Indians to establish preindustrial levels of lead. The tests highlighted the impact of lead manufacturing. He meticulously built a case focusing on two very significant facts. The first was that lead concentrations in humans had risen to between 500 and 1,000 times preindustrial levels. The second was that no threshold concentration for lead toxicity in humans had been established. Beyond compromise or corruption, Patterson was attacked and belittled by corporation spokespeople and house scientists. However, all of Patterson's research has now been corroborated, and his methods have revolutionized environmental and medical research.

Patterson had his allies. Novelist Saul Bellow created a scientist (Sam Beech) in *The Dean's December* who was a paragon of virtue and meticulousness. Bellow let it be known that the character was not modeled after Patterson—it was Patterson. Bellow also was extremely vocal in promoting Patterson for the Nobel Prize.

A crucial ally was Senator Edmund S. Muskie of Maine, who chaired the Senate Special Subcommittee on Air and Water and was in charge of public hearings. Patterson's testimony, combined with one of his research articles ("Contaminated and natural lead environments of man") created a turning point and led to passage of the Clean Air Act in 1970.

Preeminent geochemist Gunter Faure was once asked his opinion of Patterson. "Patterson's a saint," he responded. "The fact that we stopped using leaded gasoline is largely his doing, and he showed you can't study lead contamination in humans because there are no uncontaminated people anymore. I think he was a very brave man. As a man, he ranks right alongside Newton and Galileo." ❖

Tim Lane is the Fitness Consultant and ICN Coordinator for the Iowa Department of Public Health. In that capacity he initiated FITnet, a daily e-mail publication that combines health and history. FITnet is delivered to hundreds of thousands of readers around the world every weekday.

Iowa— A Place to Grow... Healthy

by *Tim Lane*

SHS (IOWA CITY)



The message on the back of this postcard reads: "Mt. Hosmer . . . rises to some 450 ft. above the river at low water mark, but as viewed in the picture seems not nearly so high."

Beyond our borders, Iowa is known as a breadbasket, and our reputation for feeding the world is widely known. But we have learned that eating well and eating too much are not the same. Americans are now facing an epidemic of overweight and obesity. During the past 20 years, obesity among adults has risen significantly in the United States. The latest data from the National Center for Health Statistics document that 30 percent of U.S. adults (20 years and older), or 60 million people, are obese. That condition alone is related to 112,000 deaths. In Iowa, 37 percent of adults are overweight and 24 percent are obese.

To fight that epidemic an Iowa initiative called Lighten Up Iowa is impacting America. After a pilot effort in 2002, the statewide effort in 2003 involved 14,000 Iowans and participants from seven other states. Lighten Up Iowa promotes physical activity and good nutrition via a team and competition format lasting five months. This group effort helps change environments that contribute to individual success. Sponsored by the Iowa Games, the Iowa Department of Public Health, and Iowa State University Extension, Lighten Up Iowa has generated more than 10 million miles of activity and more than 50 tons of lost weight. Variations of this program are now in more than 21 other states and is collectively known as Lighten Up America.

In this struggle, as with other efforts, we can find plenty of heroes from Iowa's past and present to inspire us. Just last year in the Boston Marathon, the fastest time by a man was 2:11. Cheri Blauwet, an Iowa native studying medicine and public health, covered the course almost 30 minutes faster in her wheelchair, turning the concept of handicapped on its head. In 1971, a year before Title IX, 20 percent of all U.S. high school female athletes were from Iowa.

Farther back in our past, during the Civil War, Annie Turner Wittenmyer, of Keokuk, Iowa, crusaded for "diet kitchens" that would serve nutritious food to wounded and sick soldiers in military hospitals. Ulysses S. Grant said of her: "No soldier on the firing line gave more heroic service than she rendered." During the war's last 18 months, diet kitchens issued two million rations monthly.

In 1851, one of the bluffs overlooking Lansing and the Mississippi River in northeastern Iowa was named for Harriet Goodhue Hosmer—even though she spent less than two hours in Iowa. Born in 1830 in Massachusetts, Hosmer was encouraged by her father to pursue physical exercise after her mother and siblings died of tuberculosis. In 1851, she was traveling up the Mississippi on a steamboat. When the boat stopped in Lansing and the young men on board proposed a footrace to the top of the bluff, Hosmer joined in the competition. Her early devotion to fitness paid off and she won the race. The mayor and townspeople agreed with the captain's suggestion to name the bluff after Hosmer, as a fitting prize for her energy and ability. Hosmer went on to Rome the next year to study sculpture. Her work frequently addressed the theme of strong women.

Today visitors can enjoy a spectacular view of three states (Iowa, Wisconsin, and Minnesota) and the beautiful Mississippi River simply by driving—or running—to the top of Mt. Hosmer. ❖

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Public Health in the Past 30 Years

by Louise Lex

Methamphetamine, HIV/AIDs, West Nile virus, and antibiotic resistance have become part of our vocabulary, but these words were virtually unknown as recently as the 1970s. New diseases have emerged, and yet some of the older diseases such as tuberculosis have not been eliminated. In fact, some have become resistant to drugs once thought of as panaceas. Another change in public health is the very definition of what is a health problem. Violence and substance abuse, once considered to be personal concerns, now are viewed as significant health problems.

Regardless of changing terminology and disease threats, public health has focused on three fundamentals: assessing health problems, ensuring that services are available to meet the problems, and developing policies that result in longer, healthier lives. Someone defined this goal as dying young at an old age.

Public health in recent decades has attended to Iowans' everyday health, including seeing that everyone who needs a flu shot gets one and that young children sit in child-safety seats (something not considered important in the 1970s).

Although public health is most effective when it is invisible, because it has prevented an epidemic or the spread of disease, people take special notice of its work during disasters. After United Flight 232 crashed in Sioux City in 1989, more than half of the passengers and crew survived. Pilot Al Haynes credited the preparation and cooperation of communities, the airport, and health workers, as well as their emergency response group drill and an annual update of the response plan. Haynes also credited the outpouring of support, in that "400 people showed up spontaneously to give blood with no call for donors having been sent out; they just arrived because they figured it would be needed."

Iowans today consider environmental contaminants as one of their major concerns. Only schools and economic issues (unemployment, taxes, and government budgets) rank higher. Citizens have called for environmental protection to reduce the effects of such contaminants as lead-based paint. Iowa ranks fifth among the states in the percentage of housing built before 1960; third, before 1940. Lead-based paint was not banned until 1978. The rate of lead poisoning among Iowa children under age six is four times the national average. Since the 1990s, local programs have been initiated, and

more than half of Iowa children born in 2000 have received at least one blood-lead test.

One of the most difficult challenges in public health is changing health behaviors. Change goes well beyond an individual deciding to stop smoking, to exercise more frequently, or to improve nutritional choices. Family income, health insurance coverage, peer pressure, community support, media influences, and access to parks and outdoor recreation are but a few of the forces that shape individual or group health behaviors. Risky behaviors can lead to such diseases as cancer, heart disease, and stroke—Iowa's three top killers. Public health now recognizes the multifaceted nature of risk factors and knows well that one-shot efforts do not bring about change. The task is to rally community and health partners in public and private arenas to use science-based methods that eliminate risky behaviors, reduce specific diseases, injuries, and impairments, and address environmental and system challenges. For example, between 2000 and 2002, community partnerships and Just Eliminate Lies (JEL), a youth-led movement, helped reduce tobacco use by 13 percent among high school students, and by 31 percent among middle school students.

In the 21st century, public health in Iowa has broadened its umbrella to include partners that cross economic, political, and social boundaries. A prime example is Healthy Iowans 2010, a strategic plan to advance the boundaries of healthy living and the quality of life. Developed by some 500 concerned Iowans from 200 organizations, the plan was updated in 2005 by another 425 Iowans. Organizations involved have taken responsibility to see that specific actions result in reaching goals.

In 1848, Alexis de Tocqueville noticed Americans' proclivity for joining forces to assist one another. He said, "From that moment, they are no longer isolated . . . but a power seen from afar whose actions serve for an example and whose language is listened to." Although collaboration is part of the American heritage, Iowans have rediscovered its value in health planning and implementing programs. ❖

Louise Lex is the coordinator of Iowa's state health plan, Healthy Iowans 2010, in the Iowa Department of Public Health. Since its beginning in 1997 she has coordinated the biennial Governor's Conference on Public Health: Barn Raising I, II, III, IV, and V, which brings together some 800 professionals, community activists, and policy makers concerned with public health issues.

People live 30 years longer than they did 100 years ago and 25 of those years can be attributed to public health.

- *Vaccinations*
- *Motor-vehicle safety*
- *Safer workplaces*
- *Control of infectious diseases*
- *Decline in deaths from coronary artery disease and stroke*
- *Safer and healthier foods*
- *Healthier mothers and babies*
- *Family planning*
- *Fluoridation of drinking water*
- *Recognition of tobacco as a health hazard*

—Iowa Department of Public Health

NOTE ON SOURCES FOR THIS ISSUE

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SHSI (DES MOINES); WALTER BIERRING COLLECTION

World-famous Berlin bacteriologist Robert Koch (far right) poses with his kinfolk in April 1908 in Iowa. From left: Arnold Koch (St. Louis); Hedwig Koch (Robert's wife), Adolph and Johanna Koch (Keystone).

One in a Million

Among the millions of items in the State Historical Society of Iowa collections is this 1908 photograph of Robert Koch and his family. In the early 1880s, Koch had discovered the bacilli that caused cholera and tuberculosis. His groundbreaking work made him a world celebrity for years. Even in 1908, nearly 25 years later, Koch was hounded by reporters when he landed in New York, on his way to Japan. "The first thing that greeted our sight was a group of fellows who acted as though they were going to eat us up. Cameras were stuck up in our faces in the most insolent manner possible. Every time I opened up my mouth a dozen note books and pencils would appear."

Of Chicago, Koch said, "I got so tired of reporters that every time I saw one I felt like shooting him. . . . They met us at the train, followed us in a cab, and camped outside my door. . . . I asked for some stamps from the office and bless me if the boy who brought them did not turn out to be a reporter."

To elude the press, he and his wife reported falsely

that they were headed to St. Louis. Instead they went to Koch's brother's home near Keystone in Benton County. There, breakfast was interrupted when a Cedar Rapids reporter drove into the yard. Koch consented to an interview, and the reporter's lead in the April 19 *Cedar Rapids Republican* fairly chortled: "Last Friday, while the reporters for the papers in St. Louis and Kansas City were lined up at each incoming train, waiting for an opportunity to interview Dr. Robert Koch, . . . the doctor was resting comfortably at the home of his brother, . . . chuckling every now and then as he thought how cleverly he had outwitted the pestiferous newspaper reporters of Chicago."

Even for this Iowa reporter, however, the world-renowned bacteriologist had no patience for what were by now trite questions. The reporter asked him how he had discovered the cholera germ. "I was looking for it," Koch replied, "and that has been so long ago that the matter has been thoroughly discussed in every paper in the world."

—The Editor

FRONT AND BACK COVERS: SHSI (DES MOINES), DES MOINES REGISTER AND TRIBUNE



With a desk covered with books and a pair of wool mittens, Drake University junior Barbara Ripee sneezes in this December 1945 photo, captioned, "If you're wise, say Des Moines health authorities, you'll take three days off and stay home." Advising the public on how to stay well has been the goal of public health workers for decades. This issue commemorates the 125-year anniversary of the Iowa Department of Public Health.

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