

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.

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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. ❖

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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**.