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 nonspecific 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 antitoxins 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. ❖

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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