Pioneer Science and the Great Plagues

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disclosure of tuberculosis in the college dairy herd caused an intense, partisan discussion. The Board of Regents terminated Mayo in 1897 and ordered a retest by the college veterinarian, Paul Fischer, who called in Bureau of Animal Industry veterinarian T. A. Geddes and James Law from Cornell to assist in testing. Vindicating Mayo, the animals he had declared reactors were positive on retest and were slaughtered and the carcasses burned.

Bacteriology laboratories were being added in most agricultural colleges. In November of 1895, an additional $100 was added to the Iowa State College budget when a request was made for laboratory facilities to teach bacteriology. Struggling for another three years and frustrated with his low salary and the little money budgeted for research, William Niles resigned to accept an offer to work for the BAI. A consistent supporter and contributor to the Iowa Veterinary Medical Association, Niles had been particularly popular among veterinarians in the state.

James Wilson, professor of agriculture and director of the Experiment Station at Iowa State College, was a friend of Niles. He had become secretary of agriculture in President McKinley’s cabinet in 1897 and was instrumental in getting Niles into the BAI. Born in Scotland, Wilson was secretary of agriculture longer than any cabinet officer in history. The BAI moved Niles to a new position in western Iowa, where he was assigned to investigate the effectiveness of an antiserum against the hog cholera bacillus in a seriously spreading outbreak of hog cholera in southwest Iowa.

Dean Stalker asked the Board of Trustees for $75,000 for new facilities for the veterinary school. An editorial by the new associate editor of the American Veterinary Review in 1899 noted that Iowa State College “under the wise guidance of Professor Stalker, has made a national reputation . . .”

15. THE 1890s: HORSE MARKETS AND ENROLLMENTS DROP

James Paget, a first-year medical student at St. Bartholomew’s Hospital in London, discovered larvae of the roundworm *Trichinella spiralis*. Dissecting a human cadaver, he noted small white specks in muscle that when examined microscopically proved to be cysts with tiny worms inside. The worm larvae were connected to disease when a German girl, preparing meat for Christmas,
developed fever and myalgia. Brought to a Dresden hospital, she died after fifteen days of excruciating muscle pain. When pathologist Friedrich Zenker removed a sliver of muscle from her arm, crushed it, and examined it microscopically, he saw dozens of the same tiny worms wriggling about. Zenker reported trichinosis as a new disease.

Germany solved the trichinosis problem when pathologist Rudolf Virchow, working with rural veterinarians, revealed that pigs suffered the same disease and that it moved into humans through infested pork. He noted the insidious nature of trichinosis: the encysted worms could survive for decades and be activated years later by stress, even by severe sunburns. Virchow’s progress in promoting licensure and pathology training for veterinarians in Germany paid off when trichinosis disappeared as a problem in German pork. In 1866, pathologists in a hospital in a suburb of Hamburg, examining tissue from a woman undergoing breast cancer surgery, found masses of trichina cysts in her muscle tissue; ten years previously she had lived with her brother in Davenport, Iowa, where both had suffered a severe muscle disease. As meat imports increased, Europeans began to worry about the safety of American pork.

Beginning with Austria-Hungary and Italy, one by one, European countries banned importation of American pork. Under pressure from the livestock industry, the Bureau of Animal Industry received a new mandate on August 30, 1890, when a meat inspection act was approved providing for inspection of bacon and salt pork; it was amended the next year to include veterinary inspection of live cattle, hogs, and sheep whose meat was destined for export. In Chicago, an exacting microscopic study of trichinae in pork done for the BAI by H. J. Detmers showed that about 2 percent of hogs from certain sections were infested but that hogs in some states were free of these parasites—safe enough for Americans but not for Europeans. To overcome the trade barriers, microscopic inspection of meat samples to detect trichinosis was begun by the BAI in 1892; it was to protect the market, not the public. Pork to be exported to countries that required such inspection were examined, but not pork destined for public consumption in the U.S.

Veterinary education was changing rapidly to meet the new challenges. Curricular standards were becoming more rigorous, surgical anesthesia had arrived, and the new discipline of bacteriology had led to astonishing discoveries in infectious diseases. Successful vaccines and antitoxins became
available for the veterinarian. University-affiliated schools were being innovative and moving to a three-year curriculum.

Conflict was growing with the large private schools over increased standards. The private American Veterinary College’s Professor J. S. Robertson boasted at the annual banquet of the national organization that “a Yankee does not have to attend college half as long as a German or a Frenchman, to learn how to pick up a horse’s foot.”

To deal with the conflict over standards for veterinary education, the American Veterinary Medical Association resolved that no student enrolled after January 1, 1893, could become a member of the association after graduation except that he graduated from a college having a course of three years. Academic faculties resisted any intrusion by the association. Iowa State’s Dean Stalker wrote: “I am pleased to see that there is a conservative spirit manifesting itself, and little of the disposition to dictate to colleges what they must or shall do.”

In 1894 the BAI’s curricular standards became a requirement that had to be met before a new school would be certified to grant a veterinary degree. Because the BAI employed so many veterinarians and because the Army had already set down rules for employment, aspiring veterinary schools complied
with BAI standards. Schools that did not meet the standards would not be approved to grant the DVM, VS, or VMD degrees.

Tiny private, for-profit veterinary schools that had developed in the closing decade of the nineteenth century were having problems big time. Most lacked students, faculty, funds, and facilities and disappeared. The Iowa Veterinary College founded in Des Moines was short-lived (1890–1894); it conferred the DVS—Doctor of Veterinary Science degree—on only thirteen students. The Northwestern Veterinary College in Minneapolis (1881–1890) suffered the same fate. The Queens University veterinary department closed after only four years and nine graduates. Many private schools that had started—Southwest Veterinary College in Dallas, Southern Veterinary College in Atlanta, and Wichita Veterinary College—failed to meet BAI standards, were never accredited, and went out of business. Some state schools that were offering courses in veterinary science could not meet the standards and were not approved to open as a school of veterinary medicine.

By 1895 most veterinary schools had moved to a three-year course of study; the large private veterinary schools in Chicago and Kansas City seemed to be thriving. Schools in the U.S. persisting with only two years of study were the Chicago Veterinary School, the Ohio Veterinary College in Cincinnati, and the two schools in Washington, D.C.: the United States College of Veterinary Surgeons at 222 C Street NW and the National Veterinary College at New Jersey Avenue and O Street. Blind to the advancing standards and demands of science, all four would close in the next decade.

To provide scientifically competent veterinarians for the BAI, Director Salmon had established the National Veterinary College in Washington, D.C., in 1892. Unable to hire well-trained graduate veterinarians, Salmon and the staff were behind the creation of the new college. It was designed as a private school staffed largely by BAI scientists, and the faculty included Salmon as dean with faculty members F. L. Kilbourne, Veranus Moore, and the parasitologist Charles Stiles. Unfortunately, Salmon had modeled the National Veterinary College on a minimalist curriculum with few entrance requirements and short terms, espousing a trade school concept with a term of two years. Salmon was widely condemned for his approach. The president of the McKillip Veterinary College in Chicago, highly critical of the project, joined with other midwestern schools and worked to force its closure. The National Veterinary College suspended operations in 1898 due to lack of students, and
Salmon’s subsequent attempts to transform the college into an exclusive postgraduate school failed.64

In the 1890s, veterinary schools associated with universities were in hard times. The school at Iowa State College, after twenty years of operation, was in a grim state; it had few students and lacked proper facilities, and the faculty was aging and seemed out of date. Facilities at the other state-supported schools—Penn, Cornell, and Ohio State—were not much better. In the Midwest, the new large private veterinary schools seemed more popular. Most farm boys from Nebraska and the Dakotas decided on the big city and left for the Kansas City Veterinary College; those from Iowa and Wisconsin enrolled in the Chicago Veterinary College. Perhaps they avoided Iowa State College since the veterinary course had increased from three to four years.

As the new century approached, teaching of veterinarians at Iowa State College had been in the two buildings erected in 1885 on Memorial Union Hill. Space was woefully inadequate. But now, there were few students in veterinary medicine and the faculty was too small and had been there too long. William Niles had retired on June 30, 1898, and the names of Professor Harriman and house surgeon Harry Titus disappear from the faculty listing for the next academic year, 1899–1900. The remnants of the faculty seemed less than distinguished.

William Niles had been a tireless participant in the state’s veterinary meetings and was highly popular among practicing veterinarians. The Iowa Veterinary Medical Association passed a lengthy resolution stating that faculty of the veterinary school are overworked and that they resolved that they “deplore the actions taken by the trustees of the State Agricultural College in disposing of the services of one of the ablest men in the West in experimental and scientific veterinary medicine.”65

At the Nebraska Veterinary Medical Association meeting in Lincoln, officer George P. Tucker instructed secretary A. T. Peters to inquire into the matter of the “Trustees of the Ames Veterinary College, of Iowa, relative to the removal of a competent veterinarian from its faculty . . .”66 Peters, the University of Nebraska’s veterinarian, routinely attended meetings of the Iowa Veterinary Medical Association and was on the IVMA committee for army legislation. In light of recent outbreaks of rabies, he was pushing Nebraska to create a position of state veterinarian.
Controversy over the resignation of Professor Niles from the college faculty caused turmoil that brought change to the “Veterinary Department.” In July, the Board of Trustees received proposals for reorganization from Dean Stalker and from representatives of the Iowa Veterinary Medical Association, as well as a petition for change from the veterinary students. The board appointed a committee headed by Iowa State president William Beardshear to study how the veterinary school could be reorganized.

In the end, Stalker was out as dean of the school and President Beardshear, unable to find a man with sufficient scientific background, assumed the position of interim dean of the Division of Veterinary Medicine. It seems that Stalker had been eased out of the deanship as the century turned, but there is no record of how it happened.  

It may have been that he had become outdated—he was unfamiliar with the new science of infectious diseases, and his expertise in poisonous plants was no longer at the forefront of animal health concerns. Maybe his story-telling abilities had become less captivating and supporting. Quaker Millikan Stalker, like his mentor Andrew Smith, eschewed personal vanity and feelings of entitlement from his position; his inability to promote his own professional work (and to praise the work of others) was perhaps a failure of leadership. Stalker had been extraordinarily proud of his veterinary clinic building on the hill and had wanted to extend the building south to what would become the main thoroughfare of the college. Perhaps his departure was tied to a younger, different vision for a new veterinary complex north of the campus, closer to the countryside and away from the hubbub of a developing campus Dog Town.

Throughout the North America of the 1890s, new scientific discoveries appeared each week and were spurring medical and veterinary research. For scientists there was a new tool. Charles Chamberlain, a young assistant working in Louis Pasteur’s laboratory, was seeking a way to produce clean water for his experiments. To filter contaminated water, he used an unglazed porcelain tube with pores too small for tiny debris and visible particles to pass. When it was discovered that Chamberlain’s filters also excluded bacteria from water, the porcelain filters found worldwide use in laboratory research and industrial processes.

In the next decade, biological researchers used Chamberlain filters in a unique way—to separate toxins from bacteria-contaminated solutions. Passing crushed leaf extracts of diseased tobacco plants through the Chamberlain filter,
Russian scientist Dmitri Ivanovsky found that the filtration fluid was free of bacteria but still caused tobacco mosaic disease; the disease was not caused by bacteria. Dutch microbiologist Martinus Beijerinck, repeating the same experiments, reused the word *virus*—Latin for poison—to name what was passing his filters. Both Ivanovsky and Beijerinck suspected that the agent causing disease in tobacco plants was a soluble toxin.

The medical world was changed with the report in 1898 by Friedrich Loeffler, a physician and bacteriologist who had reported that foot-and-mouth disease of cattle was caused by a filterable virus; solutions containing the disease-causing agent passed through Chamberlain filters and were free of bacteria but would cause foot-and-mouth disease when given to cattle. At the time, no virus had been discovered as a cause of human or animal disease. Other animal plagues were soon found to be filterable viruses—fowl plague, a respiratory disease decimating poultry in Italy in an explosive outbreak in 1878 was shown to be caused by a filterable virus.

Loeffler had the MD degree from Berlin and spent five years with Robert Koch before becoming professor at the university in the Hanseatic town of Greifswald. In the rural area he had developed a serious interest in animal diseases and on an island within the city provenance, the Isle of Riems, Loeffler built a small laboratory for his studies in cattle. In 1910 it became Germany’s Federal Institute for Animal Health for investigations on dangerous animal diseases. Today, it is Europe’s finest veterinary biosafety laboratory for dangerous animal pathogens and bears the name Friedrich Loeffler Institute.

**AT THE DEMOCRATIC NATIONAL CONVENTION** in Chicago on July 9, 1896, populist politician William Jennings Bryan from Nebraska delivered his Cross of Gold speech. Nominated for president, he was decrying the gold standard as a tool of rich financiers over the toiling farmers of the Midwest and South. It was leading to an ownership society, with massive income disparities arising through inherited wealth as opposed to earnings. Bryan ended with: “You shall not crucify mankind upon a cross of gold.” But his real message was the populist creed that rural America was being victimized by dynastic patrimonial capitalism: “Burn down your cities and they will arise again by magic; but destroy our farms and grass will grow in the streets of every city of the nation.” Perhaps the greatest orator in American politics, Bryan lost to McKinley in the election.
We are the sole concessionaires of the original and only genuine Pasteur’s Anthrax Vaccine Discovered by Profs. Pasteur, Chamberland and Roux. For the prevention of Anthrax or Charbon in horses, mules, cattle, sheep and goats. Introduced by us into this country in 1895 and successfully used by veterinarians on over 40,000,000 animals.

Antistrangles Serum
For the prevention and cure of true strangles in horses

Antistreptococcic Serum (Veterinary)
Indicated in all conditions due to streptococcus infection; notable Influenza, Distemper, Shipping Fever, Purpura Hemorrhagica or Equine Anasarca. Furnished in liquid and Dry form, the latter keeping indefinitely.

Antitetanic serum (Veterinary)
The most reliable cure for Tetanus and an infallible preventative of that disease. Furnished in liquid or dry form, the latter keeping indefinitely.

Mallein and Mallein Solution
For the diagnosis of Glanders in horses and mules. Mallein is ready for use and is furnished in one, two and five dose packages.

Tuberculin and Tuberculin Solution
For the diagnosis of Tuberculosis. Tuberculin is ready for use as sold and is furnished in one, two and five-dose packages.

Advertisement in the American Veterinary Review, 1912.
At the close of the nineteenth century, there had been no famous small animal clinics and clienteles. Colleges that had professors of small animal medicine and that listed canine medicine as a special area of study included the University of Pennsylvania and McKillip in Chicago. The School of Veterinary Medicine at Penn was the first to construct modern accommodations for the hospitalization of small animals. In the Midwest, Chicago was the exception: McKillip Veterinary College had a small animal clinic, and a pioneer small animal hospital was built by Leon Young, who, after graduating in 1896, established an exclusive practice in Chicago. But elsewhere in the Midwest, facilities for small animals were rudimentary.

At the annual meeting of the U.S. Veterinary Medical Association in Omaha in 1898—the name was changed to the American Veterinary Medical Association during the meeting—the keynote address by President Salmon deplored the current state of military veterinarians. Amidst adulterated and dangerous meat supplies and catastrophic disease of military horses there were only thirteen positions for veterinarians as noncommissioned officers—there were two vacancies because of two deaths from glanders acquired from infected Army horses. At the meeting, John Treacy from the 8th Cavalry gave a paper pleading for Congress to address the serious defects in the Army veterinary services. In the Spanish-American War the next year, Treacy died from yellow fever in Cuba and veterinarian Sam Gelston vanished during service in the Philippines.

Salmon, assisted by Secretary of Agriculture James Wilson and Rush Shippen Huidekoper, had worked throughout the year on legislation to improve the standing of Army veterinarians. Huidekoper had moved to Washington, D.C., to lobby full time for the bill—he wanted an independent veterinary corps with a colonel at the head. The bill provided that veterinarians (two for each regiment of cavalry) would have the rank, pay allowances, and retirement benefits of a second lieutenant. The bill passed the House, had the endorsement of the secretary of war, was agreeable to the president, and its sailing seemed clear in the Senate. At the last minute, the bill was sabotaged and failed to pass in the short second session of the 55th U.S. Congress in December 1898. Huidekoper, who had done the lion’s share of work on the bill, was not discouraged. His continued efforts were largely responsible for improving the status of veterinarians in the Army.
At the same meeting in Omaha, a fledgling group of educators, the Association of Veterinary Faculties and Examining Boards, met to elect officers and plan for future meetings; Stalker was appointed president and Merillat, secretary-treasurer. They were to organize the literary program for the next year’s meeting; Law from Cornell, Pearson from Penn, and others agreed to present papers the next year. But there was no follow-through. With no public explanation, neither Merillat nor Stalker went to the meeting. It was held in New York City with Marylander A. W. Clement as president—there may have been a longstanding chip-on-the-shoulder resentment from what they perceived as elitist put-downs from the East. Perhaps it was simply due to the economy and an increasing fear for the profession in the western states.

Near the end of the nineteenth century there was a collapse in the horse industry. Imports of horses into the U.S. for the decade beginning in the mid-1880s had been rising but then began a rapid decline. Not only was the nation not importing horses, the low prices in the economic panic of 1893 were immediately reflected in exports of horses. The low price of horses attracted foreign buyers. In 1894, the outbreak of war in South Africa gave impetus to the export trade as the need for military horses grew rapidly there and in Britain. But that was an artificial stimulus. By 1900 it was clear that the horse industry was in decline.

Number of horse imports to and exports from the United States, 1884–1901. (Data from Annual Report of the Bureau of Animal Industry, 1901.)
The decline of the horse market had a direct impact on veterinary school enrollments. An editorial under the headline “Veterinarians Becoming MDs” in the *American Veterinary Review* for April of 1896 noted veterinarians leaving the profession: “On account of the great depression in the equine industry, especially in the Western States, many veterinarians have become discouraged and not a few are seeking to perfect themselves for human physicians. At the Keokuk Medical College, in Iowa, alone there are three former practitioners who expect to graduate in the class of ’98. They are Dr. D. C. Thomas, late of Iowa Falls, Iowa; Dr. R. C. Blackburn, late of Hinckley, Ill.; and Dr. Robert Robb, late of Terre Haute, Ind.”

There was some brave resistance. The November 1899 issue of the *American Veterinary Review* contained an editorial titled “Passing of the Automobile,” which extolled the merits of the horse and predicted that even though the excessively rich in Newport flaunted theirs, “the automobile has seen all the popularity it will ever enjoy . . .” It damned the *New York Herald* for promoting the automobile—the *Herald*’s editors had predicted that the City would “in a very short time have three hundred in active operation in the streets of New York.”

A more realistic view appeared in the 1901 *Annual Report of the Bureau of Animal Industry*; it dealt with “motive forces supplanting animal power.” The writer noted that traction power formerly supplied only by horses was giving way, first, to the cable car and, later, to the electric street railway. Afterward, it predicted, the bicycle and then the automobile would do the same: “. . . the impression was quite prevalent throughout the civilized world that an era was approaching when the usefulness of the horse would be greatly curtailed. Extremists went so far even as to forecast a horseless age.”