Pioneer Science and the Great Plagues

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PART V

ASCENDANCE

The Agricultural Depressions of 1920–1940

Fourteen months after World War I ended there was a sharp deflationary national recession. It didn’t last long—from January 1920 to July 1921. But on September 16, 1920, at 12:01 p.m., a bomb containing one hundred pounds of dynamite and fifty-five hundred pounds of cast iron weights exploded in front of the J. P. Morgan Bank at 23 Wall Street, killing two horses and thirty-eight people and causing $2 million in damage. Carried in a horse-drawn wagon, it killed mostly secretaries, clerks, and messengers. The Wall Street bombing was never solved but was thought to be the work of Italian anarchists. Its impact was a transformation of the Justice Department’s Bureau of Investigation into the relatively autonomous Federal Bureau of Investigation—the FBI.

The short deflationary recession in 1920 was quickly followed in mid-1921 by the beginning of an astounding period of economic prosperity. The Lost Generation was attuned to the new technological advances spurred on by the war that were being developed and marketed on a large scale: automobiles, telephones, and radios. The St. Louis Cardinal games could now be heard in real time. And silent movies were coming to town. It was the Roaring Twenties, with shortened hemlines, flappers, and art deco styles. Modernity was replacing tradition.

But in the rural Midwest and South, the agricultural depression of the 1920s was prolonged and would meld without economic recovery into the Great Depression of the 1930s, and then into World War II. World War I had brought good times to agriculture economies. Good markets and governmental price supports during the war had increased income for farmers, and this in turn had led naturally to increased production as well as increased borrowing for land acquisition. When the war was over, wartime markets collapsed and overproduction of food and fiber led to price deflation. Unlike the rest of the country,
farmers never emerged from the transient 1920 depression. Too many were still owing money to the bank, and their women were not enjoying the glitz of the new Jazz Age.

By the mid-1920s, America’s farmers in the Midwest and South had their backs to the wall; the veterinarians went with them. The agricultural economy had tanked, consumer goods were costly or out of reach, and prices for corn and hogs were below what it took to produce them. But high freight rates and local taxes continued. Farm income dropped precipitously, from $15.5 billion in 1919 to $8.1 billion in 1921. More than two-thirds of bank failures took place in ten states of the South and Midwest. Veterinarians were not being called, and livestock diseases were compounding hard times on the farm.

A farmer in Eden Township got his leg caught and mangled in a corn picker. A salesman who had dropped by rushed him to St. Thomas Hospital in the county seat. There was limited money for vaccines and no doctor had insisted he be immunized for tetanus. Ten days later farmer Ladwig died the painful death of unremitting muscle spasms from tetanus. It was the midst of the agricultural depression and there was little income to deal with the many outstanding bills. Farmer Ladwig did leave one legacy for veterinary medicine—his young son Vaylord, who would enter veterinary school in 1939 and achieve fame for his work in diseases of swine.

The rural veterinarian, no longer a “horse man,” was now the man who determined profit or loss should bovine tuberculosis, hog cholera, swine brucellosis, or any other serious disease break out among farm animals. Hog cholera vaccination had saved pig farmers, but now many could not afford the vaccine. The same was true for other vaccines, such as the new bacterins to protect against hemorrhagic septicemia and tetanus. The mosquito-borne disease western equine encephalitis was sweeping the Midwest and there was a vaccine for that too—if you still had horses.

21. AGRICULTURAL DEPRESSION AMIDST A NATIONAL BOOM: THE 1920s

Veterinary college enrollments dropped precipitously during World War I. When the war ended, students returned to veterinary school but not at prewar levels. In 1920 there was a marked decline; reductions in 1921 were still more precipitous and in 1922 there were no appreciable gains. Student
numbers in private schools were serious: that year, enrollment in the private Indiana Veterinary College dropped from 137 in 1921 to 69 the next year; in Missouri, matriculation in the St. Joseph College of Veterinary Medicine went from 102 to 74. In the *American Veterinary Review*—renamed the *Journal of the American Veterinary Medical Association*—there were advertisements for free tuition for veterinary students from the Agricultural and Mechanical College of Texas and from Michigan Agricultural College. At Iowa State College, by 1924 the graduating class of the Division of Veterinary Medicine was half the number finishing in 1918. In the Veterinary Clinic, too, patient admissions were down. Several days might pass without any animal being admitted, and at one point there was only one large animal in the hospital pens. Academic veterinary medicine was again at a crossroads (see appendix IV).

In rural veterinary practices there were still many apprentice-trained veterinarians. John R. Mohler, chief of the Bureau of Animal Industry—the BAI—explained at the 1922 annual meeting of the American Veterinary Medical Association that fully one-third of all veterinarians licensed to practice by individual states had not graduated from an approved veterinary college and did not have adequate training to administer and interpret the results of the tuberculin test. In the Midwest, there were scalawags with offers for veterinary education focused on specific problems: Farmer Miles’s school at Charleston, Illinois, Graham’s Breeding School at Kansas City, and Salsbury’s Poultry Disease School at Charles City, Iowa. These tiny proprietary “schools” were owned by one person or a small group, operated for profit, and under the total control of the owner. They were offering limited veterinary science with the intent to qualify for veterinary practice of limited scope.

Private veterinary schools were responding by reducing entry requirements. At the May 1919 meeting of the Federation of Veterinary Colleges of North America held in Chicago, the private veterinary schools had decided not to maintain the entrance requirements prescribed by the surgeon general for the Army—and adopted as their own by the AVMA—but instead to meet only the lower requirements of the BAI for examination for a position as BAI veterinary inspector. But the nation needed veterinarians with more science, not less. Their actions sealed the fate of the private veterinary schools, and within five years they were no more.

The George Washington School of Veterinary Medicine closed in 1918. The Chicago Veterinary College, like the state veterinary schools, had increased its curriculum to four years, but it was too late; the school rapidly declined after
World War I ended and closed its doors at the end of term in 1920. It had operated for thirty-seven years with 2,610 graduates, one of whom, Alonzo Melvin, was the second chief of the BAI. But veterinary education and the demands for science had changed. The Kansas City Veterinary College closed, sending students and their records to Kansas State College; some students went to Colorado Agricultural College and others to the private St. Joseph Veterinary College in Missouri. The Indiana Veterinary College took in students from the closed Chicago schools and held on until 1924, and three years later the last private school, the U.S. College of Veterinary Surgeons in Washington, D.C., closed its doors.

Practicing veterinarians wanted to know what the outcome would be. Veranus Moore, the new dean at Cornell University, addressed the issue, noting that in 1910 there had been nearly 12,000 licensed veterinarians in the U.S. but in 1922 there were only 8,692 graduate veterinarians. He gave three reasons for the decline: the motor car, the bad agricultural economy, and extension of a federal mandate to test dairy cattle for tuberculosis. Correct on all points, Moore glossed over the impact of the last point.

Dairy farmers were objecting to tuberculin testing, but tuberculosis in cattle was emerging as a lethal zoonotic disease, and the enormity of the problem in human health was only now being recognized. One public health challenge—bovine tuberculosis—was shifting the focus of veterinary medicine. Emphasis was now on science and the demand was for college-trained graduate veterinarians. Apprentice-trained veterinarians were disappearing: in Edenville, Iowa, H. S. Titus placed an advertisement for the sale of his practice in the Journal of the American Veterinary Medical Association.

In 1922, the Journal published an agonizing letter about W. D. Odom, an employee of a Georgia dairy farm; it was his personal testimony on the danger of tuberculosis in milk. Ten years previously, in the fall of 1912, veterinarian W. M. Howell, the meat and milk inspector in Valdosta, Georgia, had TB-tested the progressive dairy herd with which Odom worked. Using the new intravenous tuberculin test, Howell found one “reactor”; the cow was killed and shown by postmortem examination to have tuberculosis. The second cow, judged “suspicious,” was removed from the dairy but moved by Odom to his residence in Columbus, Georgia, to be milked for his family—and to prove his belief that tuberculosis could not be “contracted from cows.” Odom “felt that the office of Milk Inspector was graft, to give some man an easy job.” He was wrong. In the
next ten years bovine tuberculosis caused the death of his wife, the permanent
disability of his son, and the hospitalization of his two daughters for years in a
tuberculosis sanitarium. The Journal included a heartbreaking photograph of
Odom and his dwarflike seventeen-year-old son, Jesse, whose tuberculosis had
settled in his bones. Jesse weighed fifty-one pounds; he had weighed fifty-four
pounds in 1912.5

Tuberculin, the product used by veterinarian Howell in Georgia, was a crude
suspension of tuberculosis bacillus proteins that had been developed by Robert
Koch to treat tuberculosis. It didn’t work in human patients with active tuber-
culosis: when injected intravenously, it caused fever but had no effect on the
disease. Taking note of its capacity to incite fever, physicians began to use tuber-
culin as a diagnostic agent; it gave confusing results. In London, nine out of
ten individuals given the test reacted positively, yet only one in ten had active
tuberculosis.6

In the U.S., veterinarians began to use tuberculin as a diagnostic test for cattle.
Known in the trade as Koch’s Old Tuberculin, it could be ordered from Pasteur
Laboratories in Chicago, New York, and San Francisco. Given intravenously to a
cow, tuberculin produced a measurable increase in body temperature to indicate
the cow had active tuberculosis. The first published article on the tuberculin test
in cattle had been from a lecture given by Leonard Pearson at the Pennsylvania
Veterinary Medical Association meeting in Allentown on September 5, 1892. It
was a time-consuming method. Pearson recommended a temperature reading
at the time of intravenous tuberculin injection at 6 p.m. and for fifteen hours
thereafter at three-hour intervals. Veterinarian John Faust of Poughkeepsie,
New York, was the first to use tuberculin to diagnose tuberculosis in cattle on
the farm. On May 19 and 20, 1893, he tested a herd of thirty-four cows in poor
health; thirty-two were condemned and slaughtered. The New York State Board
of Health did postmortem examinations and found advanced tuberculosis in
all. The report, printed in tabular form, was sensational.7

Tuberculin testing of cattle in Iowa was begun about the same time.8 The
federal government’s demands that cattle be tested for tuberculosis was not
sitting well with some farmers despite the scary evidence of danger. Veterinarians
were caught in the middle. Bovine tuberculosis had emerged as a hidden public
health dilemma and a serious killer of humans, particularly children. The BAI
produced a “moving picture” on stories of milk-transmitted tuberculosis called
Out of the Shadows, sending it free to theaters throughout rural areas.
PRESIDENT OF THE AMERICAN VETERINARY Medical Association in 1924, Iowa State College’s Dean Stange addressed the AVMA with the comment that research and education must be depended upon to keep the veterinary profession from lagging behind its sister professions. Others were saying that no more schools were needed at the time, but the ones that were still open would have to be improved in order to meet the demands of the future. Even in the state institutions, enrollment in veterinary schools was low. In his 1924 presidential address, Dean Stange also pressed for adoption of the statement of policy: “There is a lack of recognition in the profession as well as outside as to the real purpose. . . . No country on earth is so safe for animal industry as is this continent, due very largely to the organization and efficiency of the veterinary profession. . . . These facts, however, have an economic and sociologic significance not generally understood.”

By the late 1920s, colleges of veterinary medicine in the land grant state universities were again prospering, with larger classes and increased funding. Faculties had stabilized, perhaps too much so, but the professors would be the men who guided the schools for the next ten years. Most were in mid-career, were well-trained, and would be leaders in the science and education of the profession for two decades. The more progressive agriculture and veterinary schools had found a new way to reach farmers. Radio station KSAC at Kansas State had been the first to have a regular program on veterinary medicine in 1924; it was instrumental in changing the minds of the public on tuberculosis testing. Stange soon followed in Iowa, using WOI, the new radio station on campus, to promote animal health issues in Iowa. He also organized the first student chapter of the AVMA to promote professional development. Some weren’t getting the message.

Although most didn’t see it, times were changing. Dogs and cats were requiring more sophisticated treatments, public health institutions needed veterinary expertise, and infectious diseases in large medical centers began to seek help for their laboratory animals. The Mayo Clinic had first hired a veterinarian to care for its experimental animals in 1915. In 1922 it added John G. Hardenbergh, and then Carl F. Schlotthauer in 1924—both would be leaders in the veterinary profession.

The economic disaster of the 1920s agricultural depression had driven rural parts of the nation to a moral crossroads. Concerned about slang, couples in parked automobiles, Spanish fly, and “illicit dancing,” citizen groups were adopting control regulations. In rural Iowa, a notice was posted in the Ringsted
Opera House banning “wiggly dances.” At the University of Iowa, Professor Frank J. Miller argued that “in the age of jazz, our speech is clipped and clawed, mangled and misused, bespattered with obscure and obscene frothings from the melting pot.” Most complaints were trivial; some were transformed into regulations that were not.

In Tennessee, farmer and state representative John Butler successfully lobbied for an anti-evolution law. The Butler Act, passed by the Tennessee legislature in March 1925, made it unlawful to teach human evolution in any state-funded school. Because similar laws had been addressed in South Carolina and Kentucky, the American Civil Liberties Union announced that it would finance a test case should anyone be accused, and when substitute teacher John Scopes agreed to be tried for violating the Butler Act, the contrived event was underway. Held in the small town of Dayton, Tennessee, in July 1925, it was the first trial to be broadcast on national radio.

As expected, the Scopes Monkey Trial—State of Tennessee v. John Thomas Scopes—drew intense national publicity. William Jennings Bryan argued for the prosecution and Clarence Darrow spoke for the defense. But it had been rigged. The town of Dayton promoted the trial for publicity, the fundamentalist atmosphere favored the prosecution, and the pro-biblical judge threw out some of the defense’s countering use of the Bible. Scopes was convicted and fined $100, but the trial was thrown out on a technicality.

Although a political hoax, the trial did energize fundamentalists, and by 1927 there were thirteen states that had considered some form of an anti-evolution law. Creationism arrived as a concept, not from Tennessee or any other place in the South but from places like California and Michigan. It would continue in various forms well into the next century.

The reigning moral crusade in the 1920s boom had not been creationism but Prohibition, and it packed so much political muscle that at the time most politicians didn’t oppose it. The Anti-Saloon League was the Moral Majority of its day, the vanguard of a powerful fundamentalist movement that pushed anti-evolution legislation as vehemently as it did its war on booze. The Scopes Monkey Trial in Tennessee seemed to have sparked and promoted the anti-intellectualism that carried the day.

When the influenza pandemic of 1918–1919 had dissipated, there was no agreement on what microorganism had caused the disease in either pigs or humans. Streptococci and other bacteria had been isolated from human
influenza patients who were reported to have caused the disease, but no scientist could fulfill Koch’s postulates for proof—that the responsible organism could be cultured in the laboratory and the cultures, when injected into animals, faithfully reproduced the disease. Chamberlain filters were being used to establish that viruses caused influenza, but there was no animal model for influenza, and the 1918 influenza viruses were too dangerous to try human inoculation to prove that filtered nasal washings would cause influenza.

In Britain, the government’s Medical Research Council had dedicated its funds to investigations of filterable viruses as causes in human disease, and in 1922 it hired microbiologist Patrick Playfair Laidlaw to develop a research program devoted to filter-passing agents that caused human disease. Research was to be done in Laidlaw’s laboratory at the National Institute for Medical Research, a forty-acre agricultural site at Mill Hill in north London. Funds from private sources were obtained for the Medical Research Council to construct a small laboratory at the site with space to house animals.

Laidlaw enlisted the research farm veterinarian G. W. Dunkin to help develop an experimental animal model of human influenza. They selected canine distemper, an ancient plague in Britain, as the best model. Frenchman Henri Carré had reported a virus as causing canine distemper and the Italian Pontoni had produced a vaccine for the disease, but the English-speaking world was skeptical. As with human influenza, the cause of canine distemper was being proposed to be a bacterium.

Canine distemper had been a worldwide plague of dogs and foxes for over a century—Edward Jenner of smallpox vaccine fame had published an accurate clinical description of it in 1809. Early clinical signs suggested kennel cough, but distemper rapidly progressed to pneumonia, with discharges of mucus and pus that produced scabby rings around the eyelids and nose; it was particularly dangerous in puppies. The clinical signs and pathologic lesions of acute canine distemper resembled those of the severe human influenza that had occurred in 1918–1919; and just as in the medical dogma of human influenza, the cause of canine distemper was being debated: was it caused by a virus, as reported by Carré, or was it due to the bacterium *Bordetella bronchiseptica* that was being isolated from the lungs of dogs with distemper? An editorial in the *Journal of the American Veterinary Medical Association* declared: “*Bacillus bronchisepticus* has been accepted as the causative agent of canine distemper in this country.”
Turned out, dogs were not an ideal model for human influenza. The experimental disease was variable and, although pneumonia was complicated by secondary bacterial infection just as in human influenza, canine distemper was capriciously lethal: it destroyed the lymphoid system of the dog and consequently the dog’s capacity to produce immunity. Dogs that survived acute disease progressed to a variety of lethal, tissue-damaging processes, including destruction of intestinal linings, bloody diarrhea, and encephalitis. And using dogs seemed to be inhumane (and also would attract noisy antivivisection protests).

In 1924, Laidlaw and Dunkin began to use ferrets, highly susceptible to canine distemper, as an experimental animal. Nasal fluids from a dog sick with canine distemper, which they filtered to remove bacteria, when dropped into the nose of ferrets regularly produced disease. Within forty-eight hours, ferrets were dying of respiratory infection and pneumonia. This discovery of canine distemper virus by Laidlaw and Dunkin was the beginning of a long and distinguished decade that included a distemper vaccine that saved the lives of millions of puppies. Their research also gave rise to the discovery of human influenza virus at Mill Hill in the 1930s and, in the 1950s, to the discovery of interferons, a family of signaling proteins produced by virus-infected cells that induce nearby cells to activate their antiviral defenses and speed to recovery.

22. 1929: PRELUDE TO BAD TIMES

The stock market crash and bank failures of November 1929 put the entire country in a downward spiral and into the Great Depression. Urban folks were in the tank and seemed worse off since rural areas had adapted to hard times. But now there was widespread unemployment and financial collapse—not only in America but globally. For farmers there were bank failures, farm foreclosures, and loss of income. In Edenville, Iowa, both the Farmers Savings Bank and the Rhodes Savings Bank went under. For veterinary students, studies seemed to be more serious and frivolity less appropriate.

As the Christmas season of 1929 began, prospects for a merry holiday seemed grim. For those receiving the gift of a pet bird, there was an added unwelcome gift. In Baltimore, the pet shop on North Eutaw Street had parrots for sale. On