Pioneer Science and the Great Plagues

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Survivors of the Bataan Death March, who had also lived through brutal transport and atrocity-laden prisoner of war camps in Japan, brought back a strange story. Captain Burton Thomson of the Veterinary Corps had been shot in Corregidor by an American traitor named Provoo, who was cooperating with the Japanese. John David Provoo, a U.S. Army staff sergeant assigned at Corregidor in 1942, spoke fluent Japanese, had converted to Buddhism, and had aided the Japanese in controlling surrendering Americans.

Captain Thomson had grown up in Swea City, Iowa, and graduated from the Iowa State College veterinary school in the Class of 1938. At 6’5” and weighing 250 pounds, he had played basketball for the Cyclones. A Delta Upsilon fraternity man, he had married the Tri-Delta queen of the veterinary ball and had left an infant son behind when he departed for the Philippines. In Manila, Thomson had been assigned to head food inspections of the Quartermaster Corps. In the first days after capture at Corregidor, Thomson had developed a combative relationship with Provoo, refusing to give the victors the remaining food supplies hidden in the tunnels and meant for American soldiers. With Provoo’s complicity, Thomson was driven into the jungle and shot by the Japanese.21

After the war, Provoo was court-martialed, tried, and convicted of treason in New York. On appeal, his release was granted on the basis that prosecutors had introduced his homosexuality, which had improperly influenced the court. Avoiding prison, Provoo returned to postwar Japan.

29. PRELUDE TO THE SCIENCE REVOLUTION

When World War II ended, the business of the country rapidly moved back into the civilian economy. Returning military veterinarians provided a young vital workforce eager for new technical innovations, spreading American products into the global void caused by the destruction of European and Japanese industries. To keep abreast of new techniques and drugs developed during the war, practicing veterinarians flocked to state and national professional organizations and to meetings offered by state extension programs.

Returning soldiers took advantage of the new GI Bill, the provisions of which paid for tuition, books, and much of the costs of college. One of the greatest
economic recovery programs ever created, the Servicemen’s Adjustment Act of 1944, required that veterans must have served in the active Army or Navy on or after September 16, 1940, must have been discharged from the active service under conditions that were other than dishonorable, and were not over twenty-five years old at the time of entry into active service.²¹

By 1947, most land grant colleges had student bodies double the prewar enrollment. To ease the crisis, prefab wooden barracks and round-roofed metal barracks obtained as Army surplus units were built on campuses for classrooms and housing. To accommodate the massive student loads, existing veterinary schools doubled their faculties. Most pioneer veterinary schools began planning and built new facilities. One of the most expansive was the veterinary school at Ohio State. Because it was hemmed in by two campus powers on the east side of the Olentangy River, the medical school and the football stadium, Dean Krill negotiated a tract of land on the west bank of the Olentangy for a new
College of Veterinary Medicine campus adjacent the Agriculture campus. The building committee composed of department chairs began with a $2 million structure for the basic sciences—dedicated in 1958 and named Sisson Hall, after the famed professor of anatomy.

Eight new veterinary schools were established in land grant institutions—double the number there had been before the war. In the Midwest there were five new schools—at the university in Illinois, Minnesota, Purdue in Indiana, Oklahoma, and Missouri. Elsewhere, new schools appeared at the University of Georgia and the University of California at Davis. The new schools were sucking up new young faculty from the established schools more quickly than they could be replaced. Both new and old schools were scrambling to build competitive research programs.

The 1950s brought a striking change of mission and refocus of the veterinary profession. There was an increase in demand for health care of dogs and cats. The economy was booming and people were spending money on their pets. Easterners had a long history of health care for companion animals, and after the war small animal hospitals were being added to even small towns. In New York City, the Westminster Dog Show had gotten its name from a long-defunct hotel in Manhattan. Sporting gentlemen meeting there to drink and fib about their shooting trophies formed a club that in 1877 put on a dog show at Gilmore’s Garden, the forerunner of Madison Square Garden. To everyone’s surprise the show attracted over twelve hundred entries. Westminster’s coveted Best in Show award was first given in 1907. It was won by a smooth fox terrier bitch, Ch. Warren Remedy. She would win the next two years as well and still holds the record for winning Best in Show three times.

New multiauthored textbooks on small animals appeared—*Canine Surgery*, *Canine Medicine*, and then *Feline Medicine*—all authored by new experts in the field. McGrath at Penn published *Canine Neurology* and Miller at Cornell, *Anatomy of the Dog*. Advancements in sciences for surgery, neurology, and renal disease in dogs and cats were astonishing. Clinical pathology laboratories for testing blood and urine were becoming more sophisticated, and the data produced led to big-time experts and to advances in teaching clinical medicine.

The major progressive academic centers for companion animal health were at Penn and Cornell, as well as in the new schools in California, Colorado, Minnesota, and several others. Prewar, only a few of the midwestern veterinary students had been interested in specializing in small animal practice, but new
small animal clinics had appeared in Des Moines, Omaha, Kansas City, and Minneapolis and were more profitable, had better hours, and took less toll on the physical body than large animal practice. For students, there were increased admissions of dogs and cats into Stange Memorial Clinic at Iowa State College.

The surge in small animal veterinary medicine was centered in New York City’s Animal Medical Center and in Boston’s Angell Memorial Hospital. The Animal Medical Center had begun in the Lower East Side in the heart of New York’s largest poor and immigrant section, and by 1920 the hospital had been treating nine thousand patients annually. Difficulties began in 1921 with the death of Ellen Prince Speyer, the sponsor and supporter, and worsened during the Depression. In the postwar boom the hospital prospered, and in January 1960 construction began on a new $4 million facility on 62nd Street just west of the East River near Franklin Delano Roosevelt Drive and the Queensborough Bridge. The new facility opened in 1962 with new initiatives that included intern and residency programs, 24-7 emergency veterinary service, and staff increases that went from twenty in 1960 to seventy in 1980—and included three board certified veterinary pathologists. Postgraduate courses in clinical veterinary medicine were added, and Animal Medical Center was billing itself as the largest hospital for small animals in the world.

Surgical instruments for small animals had improved strikingly. Many new instruments, like the Mayo forceps and the Kelly hemostat, had been developed for human surgery and bore the names of famous institutions and surgeons. Those for special veterinary surgery were developed by veterinary surgeons, including stainless steel templates for artistic ear trims and the Snook hook used to snare the uterus from the abdominal cavity during spay operations using a tiny incision.

Public interest about nutrition for small animals was increasing, and so were markets for dog and cat foods. Mark L. Morris, who graduated DVM from Cornell University in 1929, built his new small animal hospital in Edison, New Jersey. He had started veterinary school at Colorado State College but was asked to leave in the clinical years because he was devoted to small animals, not to livestock. In his small animal practice, Morris had a common but frustrating problem: chronic kidney disease in old dogs. Despite treatment, kidneys failed progressively and dogs died. Morris was convinced that a low-protein diet would protect the delicate membranes in the kidney that filtered blood
to make urine; he reasoned that these membranes were being overwhelmed by too much protein.

Devising a soft wet diet that was palatable but low in protein, he began making it in his home, canning it in a pressure cooker for his patients. The special diet was so popular that demands from clients overwhelmed his tiny home operation. Morris contracted with the Hill Packing Company in Topeka, Kansas, to manufacture the diet, which they marketed as Prescription Diet k/d (for kidney diet) and sold only through veterinarians. It was astonishingly successful. Sales of k/d led to p/d (for puppy diet), and then to other specialized diets. The expanding market led to a personal fortune, much of which was diverted to a foundation, established in 1948, dedicated to research on the health care of companion and wild animal species. The foundation project got its stimulus when the Morris diets led to the recovery of Buddy, the guide dog of Morris Frank, who just happened to be an ambassador of The Seeing Eye, one of the first organizations for the blind. This was the spark for starting the Buddy Foundation, which changed its name to the Morris Animal Foundation in 1948. In the late 1950s, the foundation was headed by Mark L. Morris Jr., who led support into wildlife disease studies. Today the foundation supports such diverse diseases as contagious cancer in Tasmanian devils, lead poisoning in bald eagles, and the gut microbiome in obese dogs.

The pharmacologic armamentarium in veterinary practices changed after World War II with the appearance of antibiotics, sulfonamides, and parasiticides. There were barbiturate anesthetics, diethylstilbestrol for reproductive efficiency, and a new rabies vaccine for dogs grown in chick embryos. Veterinarians in private practice were increasingly innovative and developed new technology. The first antibiotics to be marketed for animal health—tyrothricin for skin infections and penicillin for mastitis—were for streptococci, staphylococci, and other gram-positive bacteria. Perhaps more important for treating bacterial disease in animals was the appearance on the market of streptomycin for gram-negative bacteria.

Streptomycin was discovered in 1943 by Albert Schatz, a twenty-three-year-old Chilean graduate student working in the laboratory of Selman Waksman, a Ukrainian-born soil microbiologist at Rutgers University. Schatz found two strains of the fungus *Streptomyces griseus*—one from a heavily manured field,
the other from the pharynx of a chicken— that produced a toxin that killed gram-negative bacteria. From June to October, working night and day in the wartime atmosphere, Schatz developed a fermentation system that would produce useful amounts of this new mycotoxin, which they called streptomycin. Shown to be effective against *E. coli*, *Salmonella* species, and other gram-negative bacteria, it appeared that streptomycin could fill the gap in the spectrum of antibiotic therapies.

Waksman was department chairman and took over as the front man for streptomycin. At a national microbiology meeting, he met veterinary pathologist William Feldman from the Department of Experimental Medicine at Mayo Clinic, who was working with a model of human tuberculosis in guinea pigs. He advised Waksman to undertake the search for an antibiotic against human tuberculosis. According to Schatz, Waksman was “afraid to move Mycobacterium tuberculosis into his laboratory” but agreed to undertake a project to test streptomycin with Feldman and H. Corwin Hinshaw, a renowned tuberculosis expert and physician at the Mayo Clinic. It was agreed that experimental work would be done at Mayo Clinic using Feldman’s guinea pig model to prove that streptomycin was effective against tuberculosis bacilli. Feldman designed the tuberculosis therapy experiments in animals; they were highly successful and established streptomycin as the first antituberculosis drug. Feldman developed tuberculosis during his investigations with tuberculous guinea pigs and was cured with streptomycin.

Selman Waksman never acknowledged Schatz’s discovery and contributions. Rutgers University patented streptomycin and the drug was produced commercially by Merck and Co., with whom Waksman had a financial arrangement. Streptomycin made millions for the university. Waksman finagled a contract whereby he and Schatz would only receive $1 for their work. Clandestinely, another part of the Rutgers deal gave Waksman 20 percent of the royalties—$350,000 in the first few years. Waksman, falsifying stories about the scientific work, took the entire credit for the discovery of the mycotoxin, the method for fermentation, and its killing capacity for bacteria. He was awarded the Nobel Prize in 1952 for the discovery of streptomycin. Years later, Feldman visited Schatz in Santiago, Chile, on a trip to South America and was surprised to learn that the streptomycin he had used in guinea pigs had been produced by Schatz, not Waksman.
Foot-and-mouth disease was a perpetual danger. Shipments of zebu cattle to North America began in 1945; their entry was only approved after strong pressures from American and Mexican cattlemen. Newly arrived cattle were to be detained on an isolated quarantine station off the coast of Mexico. When the second shipment was released from quarantine into the mainland of Mexico, foot-and-mouth disease was identified on December 26, 1946. As allowed by the Tariff Act of 1930, the U.S. border with Mexico was closed. The Mexico-United States commission to eradicate the disease was one of the best
examples of American international cooperation against an economic threat. Through a program of testing, slaughter, burial of dead animals, vaccination, and disinfection of premises, foot-and-mouth disease was eliminated from Mexico in May 1953.

Diagnosed in central Canada in February 1952, foot-and-mouth disease had been introduced by a German immigrant farmworker carrying meat in his luggage; he had worked on the farm for only three days, but ten days after he left, the farmer noticed his pigs were off feed and salivating excessively. The outbreak occurred in midwinter on only forty-two premises involving seventeen hundred cattle. Extremely cold temperatures restricted human movement, and the highly efficient response by Agriculture Canada rapidly eliminated the disease. Nonetheless, it cost the Canadian government $800 million in dead livestock, compensation to farmers, and a drop in the cash value of Canadian livestock by $540 million.

Fears that the proposed Pan-American Highway linking Pacific coastal areas of the American continents would spread foot-and-mouth disease led the National Security Council, under pressure from American livestock interests, to persuade Congress that no more U.S. funds should be allocated for construction.

IN THE LATE 1940S A Yugoslavian refugee physician named Stevan Durovic claimed that he could successfully treated cancer in dogs and cats with a substance he had isolated from serum obtained from horses given the fungus *Actinomyces bovis*, which caused lumpy jaw in cattle. Durovic’s claim was backed by Illinois senator Paul Douglas and a prominent medical physiologist in Chicago named Andrew Conway Ivy, who was vice president of the University of Illinois with responsibility for the disciplines of medicine, dentistry, and pharmacy. Ivy had graduated with degrees from the University of Chicago and carried great weight in the scientific world. He had taught at Northwestern and been president of the American Physiological Society, and he was the most prominent physician to testify at the Nuremberg trials for Nazis being tried for medical experimentation.

Ivy tested krebiozen in human patients and claimed success in many of them. In his falsified report to the medical community the drug sounded promising, and, despite the warnings of medical oncologists, the government was pressured to test it. Ten hospitals and cancer research centers tested krebiozen on human
cancer patients; none of the independent researchers observed any effect of the drug. Tested in laboratories of the National Cancer Institute and the Food and Drug Administration, krebiozen was found to be nothing more than creatine in mineral oil. It took fifteen years, but in 1964 Ivy and the Durovics, as well as their Krebiozen Research Foundation, were indicted for releasing mislabeled drugs into interstate commerce. The trial ended in a hung jury, but Ivy’s reputation as a scientist was destroyed.

There were other postwar scalawags. “Chiropractic for Animals Has Grown Into Research Projects for Students” was printed in the Coffeyville (Kan.) Journal in 1953. An illustrated article, it related how a local man, a former pre-veterinary student who was then attending the Palmer School of Chiropractic in Davenport, Iowa, was spearheading a movement for veterinary chiropractic. He proposed the wobbly idea that his training would lead to expertise in diseases where “adjustments” would be helpful, including “such obviously responsive diseases as blackleg, hog cholera, tuberculosis and anthrax.”

Before and during the war, racial discrimination was operated without restraint in the United States, with serious consequence in academia. Tuskegee Veterinary School was founded in 1944 to address the issue of discrimination in admittance of black Americans for professional study. The Middlesex Veterinary School in Boston had started in 1935 for similar reasons. It had been a component of the Middlesex College of Medicine and Surgery, established to avoid the Jewish quotas of Ivy League schools. Both veterinary and medical schools closed in 1947 when the Waltham campus was transformed into Brandeis University.

Early medical and veterinary professions looked askance at ethics of chemists, pharmacologists, and other medical men selling commercial preparations. Before World War I, selling a proprietary remedy by veterinarians or physicians was considered a debasing enterprise. The commercially connected veterinarian was embarrassing or dubious and was not wanted in the membership of associations. The Conference of Research Workers in Animal Diseases did not allow veterinarians representing commercial companies to attend its sessions—they could talk in the hotel lobby but could not participate as scientists.

W. J. Martin, a pioneer Illinois practitioner, resigned from the American Veterinary Medical Association for fear of being expelled because he wanted to manufacture a cresylic acid emulsion and advertise it for sale in veterinary journals. After World War II, views began to change when it dawned on everyone that being a research scientist and a commercial veterinarian were not mutually
exclusive. Veterinarians began not only to insert science into business but to make a profit in the change.

30. THE ATOMIC AGE

Nuclear energy research increased when World War II was over. Atomic bombs were built and tested at sites in the western U.S., sometimes with unwanted results. It was soon a serious issue and radiation disease was much on the public mind. Newsreels about survivors in Hiroshima and Nagasaki provided far greater shock and awe than did the still photos of the horrendous fire-bombing of Dresden, Hamburg, and Tokyo. Patients damaged from exposure to high doses of radiation were labeled survivors of “atomic bomb disease.” The world was learning of birth defects and leukemia suffered by children of Japanese atomic bomb survivors. The film Them!, about giant atomically mutated man-eating ants that developed near Alamogordo, New Mexico, from radiation after tests in White Sands, was a sellout; not to fear—the case was solved by two entomologists from the U.S. Department of Agriculture, an eccentric old scientist and his beautiful daughter, using knowledge and skill to tie formic acid and other clues to the ants.

All of this led to fear that cancer might arise from radioactive fallout released in the U.S. during nuclear testing. Talk of an atomic apocalypse moved from the religious fringes to household conversations in American homes.27

Citizens shifted in their views and began to worry that our former allies, now turned enemies, would employ some of the horrific weapons that had been considered for use—atomic bombs, gas warfare, and biological warfare. The Cold War began to scar the mindset of Americans at home; in the midst of recovery, genuine worries led to serious problems. The Red Scare of McCarthyism began in 1949 when the Soviets tested their first atomic bomb. The arms race had begun, and along with it a bomb shelter craze. In its overzealous investigations to seek out communists, the House Committee on Un-American Activities and its Senate counterpart did 109 investigations. The malignant behavior of Senator McCarthy and his demagoguery, lies, baseless accusations, and hunt for imaginary “communists” in every facet of life was debilitating to the American dream and the Constitution. “McCarthyism” became a term for