Pioneer Science and the Great Plagues

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General George Washington issued an order on December 16, 1776, that a farrier be included in the roster of each mounted regiment of the Continental Army. Farriers made their own iron horseshoes and kept the Army mobile; they had experience with equine behavior, lameness, and injuries to teeth and limbs but knew little of contagion. Tetanus and glanders were their two bugaboos: both killed horses—and farriers as well.

Pamphlets and books on the farrier’s art printed in the Atlantic coastal cities of revolutionary America contained cursory information on diseases of the horse. Gentleman Farrier’s Repository by J. Bartlet in Philadelphia came out in 1775 and was followed by Every Man His Own Farrier by Francis Clater and The Bite of Dogs by James Mease—all dedicated to educating farriers. There is no record of a veterinarian in the Revolutionary Army. Unlike Europe, revolutionary America had no educated veterinarians.

The Philadelphia Society for Promoting Agriculture offered a medal in 1806 for the “best essay and plan for promoting veterinary knowledge.” The winner was Benjamin Rush, a physician who had signed the Declaration of Independence and was on the faculty of the Medical School of the University of Philadelphia. Addressing his medical students “On the Duty and Advantages of Studying the Diseases of Domestic Animals, and the Remedies Proper to Remove Them,” he promoted the establishment of a veterinary chair as a component of the medical college: “Should the subject of the diseases of domestic animals be connected with instruction upon the principles of agriculture . . . it would form a still more useful branch of education.” Few seemed interested in attending a school for veterinarians. Although there were nearly thirty thriving formal veterinary schools in Europe in 1850, there were none in North America.
As agriculture prospered in North America, livestock populations increased and so did infectious diseases. With added income, farmers began subscribing to the new agricultural periodicals in which accounts of plagues in farm animals painted a scary picture, reinforcing a need for veterinary science. The *American Farmer*, started in 1819 by J. S. Skinner in Baltimore, had a veterinary section that offered advice on animal diseases. *Farm and Fireside*, an agricultural weekly distributed throughout the Midwest from Chicago, had a veterinary department.

Roving the countryside were self-trained charlatans often claiming to have been “veterinaries in the Army.” Many were quacks offering fake diagnoses and phony surgical procedures. Most were itinerants, staying but a day or a week in a town and advertising their specialties as “cow leeches” or “horse doctors” with expertise in dental treatments, gelding, and blistering or firing of the feet. Income was mostly derived from the sale of medicines of their own concoction. Amateur “surgery” often did serious damage; firing, the savage application of red-hot pokers to horses’ feet to induce “curative inflammation,” injured more horses than it saved. Diagnoses were improbable—hollow horn in cattle, wolf teeth in horse’s mouths, and other superstitious names tied to phases of the moon and signs of the zodiac. Since the horns of cattle are naturally hollow, diagnosing an ailment as hollow horn was always successful; a small hole drilled into the horn confirmed the diagnosis for an astonished and gullible farmer.

6. EMIGRANTS WEST: OHIO COUNTRY, IOWA TERRITORY, AND TEJAS

The first feeble attempts to initiate formal veterinary education might have succeeded had the presidential election of Clay vs. Polk in 1844 turned out differently. James K. Polk, a dark horse who came out of nowhere to win the 1844 Democratic nomination, had beaten Henry Clay by a whisper in the election: a change of only five thousand votes in New York would have made Clay president and veterinary education would have been different. In a letter to George Dadd dated November 25, 1849, Clay wrote: “There is no department in the medical world in which there is such a lamentable want of knowledge as that of the proper treatment of Horses and Cattle. Whoever shall supply this deficiency ought to be regarded as a great benefactor, and I shall be very glad if your exertions entitle you to that merit.”
Westward expansion was usurping national energy. In the next four years under President Polk the United States doubled in size: Texas was welcomed into the Union, Polk bluffed the British out of half of Oregon, and the U.S. went to war with Mexico to grab California and the Southwest. Frontiersman and their politicians had little interest and less time to support academic matters. Animal health care in America was dependent upon European immigrants.

In Boston, amateur agriculturalist George Dadd persisted in his campaign for a school of veterinary medicine—publishing *The Modern Horse Doctor, The American Cattle Doctor,* and *The Advocate of Veterinary Reform and Outlines of Anatomy and Physiology of the Horse.* Starting the periodical the *American Veterinary Journal* in 1851, he thought it too scientific and dumbed down the content; readership declined and the magazine collapsed. The Boston Veterinary Institute was incorporated during May 1855 with Dadd on the faculty; although it closed after five years, its graduates played a role in American veterinary medicine.⁵

Veterinarians formally educated in Europe were slow to emigrate to North America. By the mid-1800s the few veterinarians practicing in the United States included only twenty graduates of London’s Royal Veterinary School and a few from German colleges.⁶ Their only avenue for keeping abreast of science was through the new English scientific journals *The Veterinarian* and the *Veterinary Record,* and for newer immigrants the German veterinary journals.

On a visit to America in 1853, the Scottish veterinarian J. Horsburgh from Dalkeith stopped in New York, Philadelphia, and several cities in Ohio and Kentucky. He carried the title Member of the Royal College of Veterinary Surgeons—MRCVS—a diploma granted by the official British licensing committee. On his return Horsburgh published his impressions: “In all of these places, and surrounding countries for a distance of 1,200 miles, there was not a qualified veterinary surgeon. . . . Here there is ample room for our superabundant veterinary surgeons.” Horsburgh writes that in his hometown of six thousand in Scotland there were thirteen practicing veterinary surgeons who had graduated from a veterinary school.⁷ His message was the stimulus for an important group of emigrating graduates from the Highland Society’s Veterinary School in Scotland who laid the groundwork for veterinary education in rural North America. It was time. Livestock moving into the frontiers of the West—the Ohio Country, the Midwest, and Great Plains—were encountering new hazards not known in Europe.
Frontiersmen of the Midwest had first begun moving west through the Cumberland Gap to settle Ohio Country, the vast unsettled region north of the Ohio River that included Ohio, western Pennsylvania, northwestern West Virginia, and southeastern Indiana. The National Road—the Cumberland Pike—had reached Zanesville and central Ohio by 1830. Outfitting in Cumberland, the terminus of the Chesapeake and Ohio Canal, new settlers pushed past the Appalachians. Early farmsteads, built along riparian streams close to wood and water, had little quality pastureland so that cattle were turned out to browse in the woods.

Farmers in Ohio Country began to encounter a new disease in their cattle and sheep that they called trembles. Signs of trembles began with lethargy, trembling, and pungent breath and quickly ended in prostration and death. In some areas, cattle died by the hundreds, whole herds being found dead in the woods. In 1839, Ohio farmer John Rowe suspected a link between trembles and white snakeroot, a common shady woodland plant in the daisy family. Feeding the plant to cows, he reproduced trembles and then sickened young calves by giving them milk from the poisoned cows—perhaps one of the first animal disease experiments in North America.

About the time trembles first appeared in livestock, humans were afflicted with a new disease that frontier physicians named milk sickness. Patients suffered nausea, muscle weakness, thirst, and constipation, and they too had foul breath that smelled like turpentine or acetone. Although the disease was at first confused with malaria, these patients did not have fever. In Madison County, Ohio, a quarter of the population died. In Dubois County, Indiana, half the deaths in the early 1800s were due to milk sickness; one year the death toll neared one out of every two people, striking children most often. In Danville, Indiana, one-tenth of the population died of milk sickness in a single year. In the Little Pidgeon Creek settlement, one of the victims was Abraham Lincoln's mother, Nancy Hanks Lincoln.

Milk sickness also came from consumption of contaminated butter and meat. It was not seen in populous areas but claimed victims from pioneers carving their homesteads out of the forests. In the 1830s, Anna Pierce Hobbs was concerned about milk sickness. Her mother and sister-in-law had died of the disease. After some brief training in midwifery and dentistry in Philadelphia, Hobbs had returned home to be the first physician in Rock Creek, Hardin County, Illinois. Quizzing patients about their disease, she was taken by a Shawnee woman into the forest; pointing to white snakeroot as the plant she used to treat snakebite,
the woman said it was the cause of milk sickness. Feeding white snakeroot to a calf, Hobbs reproduced the toxic disease.

Contagious diseases of livestock were always a threat to survival—strangles in horses, lung parasites of cattle, and abortion in hogs and cows—but isolation and the low density of animals kept the catastrophic plagues at bay. In the Ohio Valley of the 1830s, a new killer disease of pigs had appeared. Farmers called it hog cholera but were not attentive to its slow but insidious spread into the territory. The disease moved slowly through small farms of the Midwest. As hog populations increased, so did hog cholera, and within fifty years the disease would spread through the country.

CROSSING THE MISSISSIPPI RIVER INTO IOWA, settlers heading west were confronted with what seemed to be an endless sea, the tallgrass prairie. Journals of early arrivals told of “a sea of waving grass” and of riding from Oskaloosa to Des Moines without seeing a single tree. Grass got taller the further west they went. Lieutenant Colonel Stephen Kearney, riding west with a troop of soldiers, had noted in his diary that the grass was so high it covered their stirrups; then in central Iowa the men could tie it in knots over the backs of their horses. In early summer, wild strawberries stained horses’ hooves red. Tallgrass prairies made travel difficult and carried the danger of fire—burning their animals and their families; settlers sought wooded areas along streams and creeks.

There was little white snakeroot west of the Mississippi River, but immigrant farmers had to deal with locoism. The leaves and seeds of the purple locoweed and other *Crotalaria* plant species were tasty to livestock but drove them to all sorts of abnormal behavior. Locoweed killed not only cattle but horses, pigs, and chickens. Crotalaria toxin damaged the liver and brain—hence *loco*, the Spanish word for crazy. Common in the western Midwest, Great Plains, and grasslands of Canada, purple locoweed is still the most common poisonous plant for American livestock.

As the Great Plains opened to settlers, the grasslands of Kansas and the Nebraska Territory were plowed and sewn to wheat, rye, and other grains. In wet summers, the harvests of rye and wheat were sometimes speckled by swollen black grains. After several weeks of eating the speckled grain, cattle lost weight and developed rough hair coats, painful feet, and ulcers in the mouth and around the hooves. If they continued to eat contaminated grain, gangrene appeared and cattle began to behave abnormally and even to suffer convulsions. Turns out, a parasitic fungus, *Claviceps purpurea*, had attacked the seeds.
of rye, wheat, and other grasses, transforming their seeds into a black mass and producing toxins that caused an ancient human disease, ergotism. Ergot’s alkaloid toxin constricted arteries so severely it caused gangrene in the ear tips, tails, and lower legs.  

Steamboats moving up the Missouri River carried old plagues into the Great Plains. The American Fur Company’s S.S. St. Peter left St. Louis bound for Fort Union in 1836. It carried supplies for the Missouri River ports in Kansas, the Dakotas, and Montana. It also carried smallpox. The Great Plains smallpox epidemic lasted five years, from 1836 through 1840. Although many immigrants died, there were massive death loses of Native Americans all along the Missouri Valley. The Indian Vaccination Act of 1832, passed to save native peoples in the U.S., had excluded the Mandans, Hidatsas, and Arikaras from the program.

As the U.S. Cavalry moved westward to protect the frontier, regimental farriers came with them. Endurance of the military horse was compromised by any defect in gait, and the inspection and re-shodding of cavalry horses at six-week intervals was essential. Faults in the gait of the horse were stumbling, forging, and interfering (where a foot in flight strikes the opposite leg). The farrier decided whether these were caused by improper shoes, unbalanced feet, poor conformation, or debility due to sickness. Was the wall of the front feet at the toe too long or the heels too low? Were the shoes of unsuitable weight or fitted too pointed at the toe? All of these would lead to forging, a fault of the gait in which the toe of the hind foot overtakes and strikes the bottom of the front foot on the same side at the moment the front foot is starting in flight. No trivial matter; a forging horse would fall, injuring the rider. Forging was even more disastrous when it tipped a carriage, killing the passengers.

Horses of the U.S. Cavalry moving westward into the Midwest carried strangles with them. A worldwide disease of horses, strangles was a streptococcal infection of the throat and upper respiratory tract. Seldom lethal, it could persist to become chronic, causing horses to develop bastard strangles—nasty abscesses that formed in lymph nodes throughout the body. The disease “followed the trail of the Army and bivouacked in its corrals from the days of the pioneers.”

The Black Hawk War of 1832 was a turning point in American veterinary care. War began when several tribes, led by Sauk chief Black Hawk, left their Indian homelands in Iowa, crossing the Mississippi River into Illinois. Misled by invading pioneers, Black Hawk deliberately violated the treaty, leading his tribe east across the Mississippi. The frontier battle that ensued left several hundred
dead and caused the needless loss of many cavalry mounts. It was clear that too many horses were in a weakened condition and that the infantry and the current mounted rangers could not cope with the mobile mounted Indians of the forest.

When the Black Hawk War was over, the corps of mounted rangers equipped to serve the war was reorganized as the First Dragoons and, led by Colonel Kearney, was dispatched to Missouri. For fifteen years they lived and fought in pioneer posts in the Great Plains, exploring repeatedly the headwaters of the Mississippi, the Canadian border, and Texas. Twice they were assigned to the Rocky Mountains and once to the Pacific Coast. Throughout these duties, equine mortality to contagious disease remained high. Horses of the United States mounted forces had fought in the Revolution, the War of 1812, and the Indian Wars without adequate veterinary care. The Army quartermaster general in 1853 petitioned Congress to establish an Army veterinary corps with a school for military veterinarians. Request denied.

IN THE 1830S AMERICAN IMMIGRANTS moved into Mexican territory, crossing the Sabine River and settling to the Brazos and beyond. Traveling along the Old San Antonio Trail to the land grants of Stephen Austin along the Brazos, the Anglos in the Mexican territory of Tejas soon outnumbered the Spanish-speaking Tejanos four to one. On March 2, 1836, Texas declared itself independent. As tensions increased, a Mexican army of over three thousand, led by President Antonio López de Santa Anna, moved north to assert Mexico’s international right to ownership of Tejas. Holding out in the adobe walls of a century-old mission at the edge of the dusty village of San Antonio, a ragged band of two hundred men—including American legends Davy Crockett and James Bowie—blocked the northward advance of the Mexican army for twelve days. The infantry and cavalry were repelled in two charges of a blood-stained battle. On March 6, 1836, the third Mexican charge, emboldened by the blaring strains of the chilling degüello, swept through the Alamo, killing all except Lieutenant Dickenson’s wife and infant child and a servant.

The significance of the Texas Revolution to veterinarians is that in the long and difficult marches from and to Mexico City, Santa Anna’s army had been plagued by poor nutrition and weakened by disease. It had been ill-equipped, and the damage done to the cavalry played a major role in the war. It was too late, but nearly two decades later, President Santa Anna established the first veterinary school in the Americas on August 17, 1853, in the San Jacinto Hospice. The
the school changed name, affiliation, and location several times in the next decades. Its science underpinning was weak, and the Spanish language barrier, the culture, and hostility from the Mexican-American War prevented any impact on veterinary education north of the Rio Grande. But it was the first on the continent. Today, Santa Anna’s school is the College of Veterinary Medicine at the National Autonomous University of Mexico.

As settlers moved into open Nebraska Territory, they needed additional protection against attacks by Sioux Indians. The U.S. Army had manned posts along the Platte River in Nebraska and the Big Sioux River in Iowa, and as settlers moved northwest, a new post was established at Fort Randall (now South Dakota). Located on the right bank of the Missouri River in remote hills bordering the endless prairie, Fort Randall was opposite the camps of Sioux and Mandan Indians. Cavalry units from posts along the Platte and Big Sioux Rivers were moved north and west to Fort Randall. Four companies of the Second Dragoons and their horses assembled at Fort Randall in August 1856, camping in a dry ravine. Unlike cavalry of the British and French, who had military veterinarians, the American cavalry had none—its military horsemen were notoriously slovenly in their care of their horses. Superior riders were not always good horsemen. No hay or grain had accompanied the troop to Fort Randall, and horses had been forced to forage in the weedy ravine on their own.

About the twentieth of August, ten days after they arrived, an outbreak of a slowly progressing fatal disease appeared in the cavalry horses, beginning in all four companies simultaneously. The dying horses became lame and coughed incessantly, and thick yellow mucus ran from their noses. Swelling of the throat and abscesses pressing upon the pharynx and trachea made it difficult to breathe. Striking signs of the disease included rough hair coat with loss of hair, especially of the mane and tail, and pus around the coronary band of the feet (where the hoof joins the skin), which led to painful sloughing of the hooves.

At first, the signs seemed to be typical of strangles, but none of the horses developed disseminated bastard strangles. Strangles was seldom fatal and this new disease was relentlessly lethal, killing over half the cavalry horses at Fort Randall. A farrier suggested there might be something damaging in the soil where the horses foraged. One officer wrote a summary of the disease, which a compatriot mailed to a veterinary journal in Germany. Reading it decades later, reviewers agreed that although the horses probably had persistent strangles, they were being killed by selenium toxicity—later called alkali disease. The
element selenium is plentiful in the soils of South Dakota, and some plants that survive in the dry autumn concentrate it in their leaves. Milk vetch and purple locoweed—selenium-accumulating plants—had been prevalent in the weedy ravine. When hay and grass were provided to the affected horses, the disease disappeared.

The lack of military veterinary expertise in the cavalry was noted by American captain George Brinton McClellan, who had just returned from Europe—he had been officially dispatched to observe the organization and equipment of allied armies in the Crimean War of 1853–1856. McClellan, the son and brother of distinguished Philadelphia physicians, had recognized the dangers of infectious glanders spreading in military horses and riders. Outbreaks of glanders had been devastating to British horses in the Siege of Sevastopol, and by 1860 it had appeared in McClellan’s cavalry horses. He had no counterpart to the British Veterinary Corps and no one in the U.S. Cavalry knew about how the disease might be controlled or prevented. Glanders, from the Old French glandres (glands), was a chronic unremitting bacterial infection that damaged the respiratory tract and lymphoid tissues. Appearing first as weakness, nasal discharge of pus and mucus, and swollen lymph nodes, glanders progressed to debility, with erosions in the respiratory tract, nodules in the lungs, and pustules in the skin called farcy buds; it was uniformly fatal in two to three weeks. Resembling slow and insidious tuberculosis, glanders was fatal in horses; it also infected and killed soldiers. It had been a terrifying disease in Europe and now it was here.

By the 1870s, glanders was widespread in the U.S. Cavalry. The hotspot was Benicia Barracks in the North Bay area of San Francisco. First occupied in 1849 during the California Gold Rush, Benicia was the Army’s ordnance supply facility for the West Coast: it also stabled the Army’s only Camel Corps for the deserts of the Southwest. Recently graduated, veterinarian Samuel G. Going entered the Army and was assigned to the 1st Cavalry at Benicia Barracks. He and his brother, also an Army veterinarian, had been born in New York but educated at the Highland Society’s Veterinary School in Edinburgh, Scotland. Going had a solution to the problem at Bernicia Barracks. Out of 180 horses stationed there, he killed all but 10. Blankets, halters, and cinches were burned and the stables destroyed.

Seeking improved conditions and facilities, Going proposed a commissioned rank for Army veterinarians. His petition to the U.S. Congress dated October 11, 1878, was ignored; it was the first military report made by a qualified veterinarian recorded in the War Department. Going remained with the 1st
Cavalry and was killed in action when he and ten men in a scouting detachment were ambushed during the Nez Percés War. His body was recovered and today lies in Fort Walla Walla Cemetery in Washington state.

The episodes of inferior horse husbandry and outbreaks of glanders—coupled with criminality in the Quartermaster Corps’s procurement of remounts—continued to cause astonishing noncombat deaths of horses. General McClellan, familiar with the superior horse care and veterinary services of the British and French armies, recommended that “a veterinary school should be attached to the establishment, for the instruction of officers and veterinaries.” The U.S. surgeon general did not act on the request. Army General Orders of 1879 mandated that veterinary surgeons in the cavalry be graduates of “an established and reputable veterinary school” and imposed the first standards for veterinary education in the United States. The French were at the forefront again; they had established a postgraduate school for military veterinarians, the École d’application du service vétérinaire, at their army cavalry school in Saumur.

7. THE CANADIAN MIDWEST: DIVERGENCE OF LOWER AND UPPER CANADA

The Grand Trunk Railway, Canada’s first major railroad, was completed from its headquarters in Montreal west to Sarnia in 1856. Tracks ran through Toronto, Guelph, and Upper Canada’s agricultural lands, completing a connection to Port Huron in Michigan and a rail line connection to Chicago. Four years later the Grand Trunk extended south to the cold-water port in Portland, Maine. Funded by London banks and promoted by new Canadian immigration programs, the railroad was a major economic stimulus to agriculture and livestock production. It also had an indirect but astonishing impact on veterinary medicine in North America.

Aware of the economic importance of animal diseases, the Upper Canada Board of Agriculture voted to establish a training school for veterinary surgeons and hired a local veterinarian, Scottish immigrant Andrew Smith, to teach a course in veterinary science. In 1861, Smith gave his first lectures to a small group in Toronto. The next years, more lectures, and in 1866 the first graduates of a formal course were awarded a diploma after being examined by veterinary surgeons appointed by the Board of Agriculture.