

# Bourgelat's Vision for Veterinary Education and the Remarkable Spread of the Veterinary "Meme"

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Meme: A cultural element or behavioral trait whose transmission and consequent persistence in a population, although occurring by non-genetic means (esp. imitation), is considered as analogous to the inheritance of a gene. (*The Oxford English Dictionary*)

The veterinary profession is well and truly familiar with the concept of contagion. One of the most powerful historic examples is that of the Black Death between 1333 and 1369. Its remarkable geographic spread is shown in Figure 1. At that time its cause was unknown; today we know that the infectious agent is *Yersinia pestis*. To spread it required an animal reservoir, in the wild a species of marmot, that carried the infectious bacterium in its tissues, and an insect vector, a species of flea such as *Xenopsylla cheopsis*, that ingested the agent with a blood meal, following which the agent multiplied in its gut. At the next feeding the flea regurgitated the bacteria with its saliva, infecting the next host. While restricted to the marmot ecosystem, the agent did not kill the host. When marmot pelts became valuable, however, amateur hunters invaded the marmots' territory, bringing with them the urban black rat. The jumping flea infested the new host, giving it the microbe, and also transferred it to humans. The opportunistic rats and people were much more susceptible to the disease (the bubonic plague). The great invasions of the Tartars spread the plague south to China and west to Eurasia; it then followed the trade routes via the Silk Road, pilgrimages to Mecca, and the spice routes via Samarkand, South Asia, Arabia, and Baghdad. It went via Black Sea ports to the Ukraine, Constantinople, and Venice. Once the disease reached the European mainland, its spread devastated the population. From 1345 to 1350 alone the human population dropped from 85 million to below 60 million. Remarkably, it rebounded to 110 million over the subsequent 300 years. I chose this example because it documents the greatest spread of terror in all of Western human history and because it involved a complex process that was not understood at the time, long before infectious diseases had been defined by Pasteur or even characterized clearly as contagious. In today's world, with international global travel sponsoring normal contagious transmission, with the most devastating of contagious agents being zoonotic, and with the possibility of intentional promulgation, the responsibilities of the veterinarian toward understanding and learning how to combat infectious contagious agents have expanded greatly.<sup>a</sup>

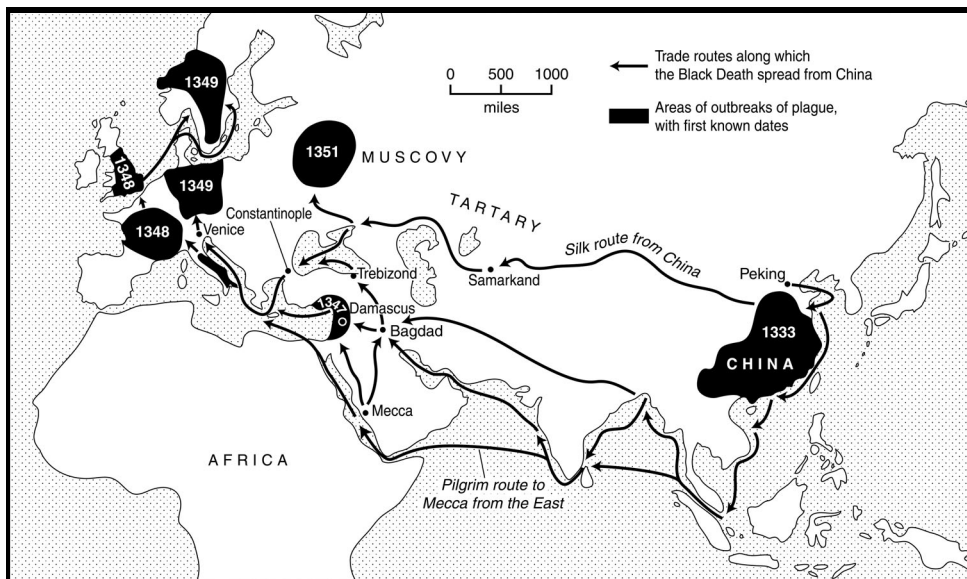
The host-parasite story has become an enormous canvas of knowledge. Richard Dawkins of Oxford University, author

of *The Selfish Gene*, conceived that the human mind is susceptible to "infectious" ideas that he termed "memes," which are elements of culture passed on by non-genetic means, especially by imitation. As such, memes are analogous to but different from genes. Thus, within Dawkins' conception, a meme can reproduce itself during transmission between individuals. Transmission need not be direct; it can happen while reading, while listening to a conversation or watching a developing situation—even, nowadays, by electronic transmission. The meme is a contagious concept. An interesting feature is that the recipient's perception and memory may distort or modify the original idea. Furthermore, while the original version may be adopted by the recipient, it may give rise to instant evolution into a different, possibly better, idea. Thus memes may replicate by forming what Manfred Eigen calls "hypercycles."

Perhaps "thought contagion" would be a simpler way of expressing the concept of memes. This process involves "catching on" to an idea because one grasps the concept and perceives it to be a significant thought, something to be held on to as important. It rings a bell, sort of "Why didn't I think of that?" When someone (or a small influential group) creates a new initiative aimed at advancing society's scope, one test of the quality of the idea(s) is whether or not it has sufficient general appeal to catch and hold the imagination of others. If so, the idea qualifies as a "meme," an inspiring thought worth telling others about, thereby rendering it contagious in the psychological sense.

## SPREAD OF THE VETERINARY IDEA IN WESTERN EUROPEAN CENTERS: "CATCHING ON" BECAUSE OF ITS INTRINSIC APPEAL

"Thought contagion," a meme, well describes the awakening to and the acceptance of the need to create a new profession specifically devoted to the health care of animals. In the late eighteenth century, the horse was a commanding feature of current events and central to all activities, from productive agriculture to transportation to war. The base of the proposal was what might advance equine performance, survival, and care. Critical interest in the meme was promoted and adopted by leading and trusted figures in society, attracting the support necessary to launch it financially. This opportunistic base fueled its contagious spread. Such were the circumstances that, in 1762, allowed the birth of modern veterinary medical education and its result, a challenging new profession.



**Figure 1: Spread of Infection: The Black Death of the fourteenth century (1333–1369). There were three episodes of Black Death in England: 1348–1349, 1361–1362, and 1369. The disease was responsible for halving the total population by 1400.**

### CLAUDE BOURGELAT (1712–1779)

Appointed corresponding member of the Academie de Sciences of Paris in 1752

Established the first veterinary school, L'École vétérinaire de Lyon, in 1762, thereby creating a new meme

Established the second veterinary school in Alfort, France; tenacious in his goals

Author of *Nouveau Newcastle*, a new treatise on cavalry (1744)

Author of the three-volume work *Éléments d'hippiatrique* (1750–1753)

The original source of this meme was Claude Bourgelat of Lyon (then Lyons), France, an equerry who had been educated by the Jesuits and trained in law. An excellent, albeit temperamental, student, he set himself high aspirations. He enlisted in the army and developed into an outstanding horseman, becoming certified as Officer in Charge of the Académie d'équitation de Lyon in 1740. He became recognized nationally and internationally by his monarch, Louis XV, and Emperor Frederick the Great. He was a disciple of the two great trainers/riders of the previous era, Maréchal Jacques de Solleysel and William Cavendish, who became the first Duke of Newcastle (and to whom was attributed the quote "hope of reward and fear of punishment govern the whole world, not only men but horses"). He updated their works with his *Nouveau Newcastle (A New Treatise on Cavalry)* in 1744. All three of these men acquired vast experience and knowledge of equine behavior and developed devices to assist in controlling powerful large horses without resort to the brutal methods used by their predecessors. Signs of Bourgelat's broadening vision were apparent in his three-volume work *Éléments d'hippiatrique* (1750–1753).

It was in this setting that Bourgelat broached the great idea he was hatching, the necessity to create schools to teach

equine medicine, or "hippiatry." It began to grow into an exciting idea among European cultural and scientific establishments. Bourgelat noted that there were no publications worthy of consideration in this field. He was very active in intellectual circles at the time of the Enlightenment, of which Paris was the focal point, being made a corresponding member of the Académie de Sciences of Paris in 1752 and of its counterpart in Berlin in 1763. He espoused the philosophy that "it is only by studying the book of nature that we can acquire certain knowledge." He applied himself to learn the anatomy of the horse and other domestic animals, going on to become aware of the principles of human medicine, guided by two Lyonnais surgeons.

Thus prepared, Bourgelat approached a close friend from his home town, Henri Bertin, who was Louis XV's Controller-General for Finances and Minister for Agriculture and a former Steward for the Generality of Lyon, with his proposal for the creation of a great new venture, an *École vétérinaire de Lyon*. Bertin was attracted by the logic of the plan, noting that the royal court alone had 5,000 horses and that Bourgelat was held in high esteem by influential military leaders and by the large number of young gentlemen he had trained in equestrian skills, many of them military officers.

### HENRI-LÉONARD-JEAN-BAPTISTE BERTIN (1719–1792)

Louis XV's Controller-General for Finances, Minister of Agriculture

Obtained an Arrêt de conseil in 1761 authorizing establishment of the *École vétérinaire de Lyon*

Encouraged the King to add a second school in Alfort, Paris, in 1765 so that he could impress heads of state: his veterinarians were the "key to cavalry power"

Insisted that the program of study at the new schools must encompass the treatment of *all important species* of domestic animals and epidemics

However, Bertin had a broader view, having become deeply aware of the terrible losses to farmers from repeated epidemics of devastating diseases such as rinderpest. Consequently, having added the broader responsibility of the medicine of all domesticated animals, he endorsed the upgrading of Bourgelat's academy to the world's first college of veterinary medicine, the *École vétérinaire de Lyon*. It received the King's blessing and opened on January 1, 1762.

The ambitious Bourgelat then lobbied Bertin to have the school transferred to Paris, where it would be at the "center of things." The wily Bertin offered an alternative more to his liking: he would concur with adding a new school in Paris, but not to closing the one just initiated. The new school, begun in Charenton in 1765, was later moved to its present site as the Royal (now National) Veterinary School of Alfort. The King took great delight in showing it to visiting heads of state and leaders, with comments about how it would advance the supremacy of French military power. Bertin added a new position to Bourgelat's duties, Inspector-General of All Veterinary Schools—a boost to Bourgelat's ego that also achieved another step toward Bertin's larger goal of creating a national cadre of veterinarians. He envisaged that they would be educated at several centers in an expanding France, with some 25 million people needing horses maintained in good health for military service and transport and a huge rural livestock population producing food and fiber to meet the needs of the general public.

The new venture did not go as smoothly as it may seem from this report so far. Two strong-willed men had competing visions about the nature of animal medicine and who was best qualified to lead it. Bourgelat's critic was Philippe-Étienne LaFosse, a leading Parisian farrier who was at the forefront of actually treating horses. He was raised in an environment where he participated in many activities involving handling and treating horses; he was recognized for his acquired knowledge and practical experience. He trained horsemen and farriers, went to the flaying yard to study equine anatomy, performed necropsies, and collected pathological specimens. He took advanced studies at the Academy of Sciences and completed a research project involving anthrax. Inducted into the army in 1758, he recommended measures to control glanders and produced a *Dissertation on Glanders in Horses* in 1761. LaFosse had a passionate love of his job as a hippiatrist; he applied for a position on Bourgelat's faculty but was turned down, leading him to become an acerbic critic of the Alfort operation. But the faculty was able to defend itself, even after Bourgelat's death in 1779. LaFosse outlived Bourgelat by 30 years. He produced a masterpiece, *Course of Hippiatry, or A Complete Treatise on the Medicine of the Horse*, after opening a private veterinary school and closing it again so that he could finish his finely illustrated book in 1772.

### PHILIPPE-ÉTIENNE LAFOSSE (1738–1820)

Equine anatomist, researcher, and clinician; most famous *hippiatre* of Paris

Author of *Dissertation on Glanders in Horses* (1761)

Author of *Course of Hippiatry, or A Complete Treatise on the Medicine of the Horse* (1772; two volumes, with some figures depicting horse with multiple defects)

Many came to consult him when planning veterinary programs

Active in the French Revolution; cared for remounts

After the launch of the profession from Lyon and Alfort, the veterinary meme spread rapidly throughout Europe. Fine and dedicated leaders emerged to maintain the thrust and give enduring viability to the new profession. Lyon and Alfort become magnets for other nations (see Figure 2).

Johann Gottlieb Wolstein, a German military surgeon, was selected for training in Paris to prepare to lead the improved new veterinary school for the Austro-Hungarian Empire. Showing unusual acumen, he elected to attend both Bourgelat's school and LaFosse's private veterinary school, having determined that LaFosse was better qualified. Wolstein also got first-hand experience of epizootic diseases in France and of livestock breeding and husbandry in Britain, Holland, Germany, and Denmark, and then proceeded to Jena, in eastern Germany, where he qualified in human medicine and surgery. Returning from his travels, he developed a new independent veterinary school in Vienna whose graduates were soundly based in both preventive and therapeutic veterinary medicine. Wolstein had one weakness: he was a vitalist who did not yet accept that there were contagious diseases, preferring to believe that they were attributable to environmental factors.

Wolstein also assisted in planning a new veterinary school in Budapest and invited Professor Sandor Tolnay, a physician, to the Vienna school for two years for training in the veterinary field. The Hungarian school was destined to flower more than a century later under the inspiring leadership of Ferenc Huttyra, who recruited an outstanding faculty and, with his brilliant colleague Josef Marek, authored one of the most influential and enduring veterinary texts, *Special Pathology and Therapeutics of the Diseases of Domestic Animals*, integrating veterinary science with clinical veterinary medicine. Appearing in 1913, it went through many editions. John R. Mohler, Director of the Bureau of Animal Industry from 1917 to 1943, translated it into English from the 1920 edition.

After 17 years of running a very successful school, Wolstein was imprisoned and stripped of all offices and honors in the aftermath of the French Revolution because he was a Protestant sympathetic to the French Jacobin movement. It is noteworthy that the man he most admired, LaFosse, took part in storming the Bastille in 1789, then became veterinary overseer of remounts. (Remarkably, both men lived to the ripe old age of 83.)

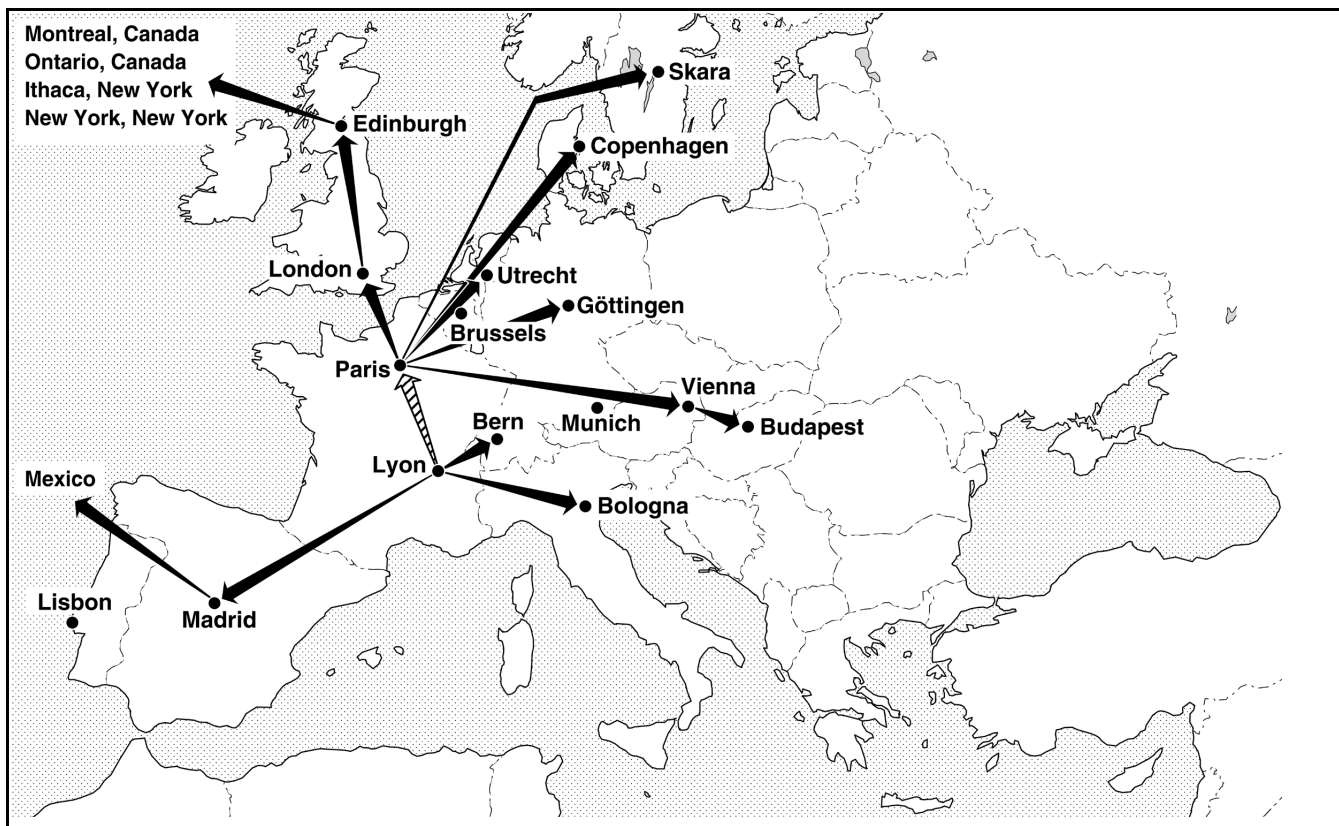


Figure 2: The spread of veterinary schools in Western Europe

### JOHANN GOTTLIEB WOLSTEIN (1738–1820)

German military surgeon selected to develop a new veterinary school for Austria-Hungary

Trained at Alfort and with LaFosse; studied epidemics, livestock farming in Europe; went to Jena to qualify in medicine and surgery

Created the new veterinary school in Vienna in 1775, attracting students from outside Austria, and later helped Tolnay to found the Budapest school

After 17 great years, imprisoned for sympathy to the French Revolution

An outstanding figure in the development of veterinary medicine in Germany was Baron J.B. von Sind of Cologne, a cavalry officer responsible for horse management and veterinary care. His important 1770 manual, *Introduction to the Science of the Stallmeister*, was a brilliant critique of the inadequacy and cruelty of many traditional practices used to treat equine ailments and provided details of how to successfully sling horses with fractures without exposing them to excessive pressure due to their weight. Johann C.P. Erxleben was a remarkable young scholar who had begun but not completed medical training. He had read and been most favorably impressed by von Sind's work, which he edited and revised. He taught physics and chemistry and in 1768, aged 24, he wrote a remarkable letter to Freiherr von Munchausen, curator of the Georgia Augusta University in Göttingen, proposing that an animal medicine program be

introduced at the university. He noted that he had been dedicated to medicine for some time and had acquired a scientific basis for it but had now learned animal medicine. He asked that the government allow him to teach veterinary medicine and *materia medica* for six months a year and build a small veterinary school. He received from the curator a reply to the effect that it would be very nice and interesting to start such a school, but advising Erxleben to conduct an experiment by first producing a book on animal medicine and its teaching. He accomplished this the next year: *Introduction to Veterinary Medicine* was published in 1768 and translated into Dutch in 1770. Then von Munchausen sent him to Cologne to study with von Sind, to Holland to study rinderpest, and to Lyon to observe the new veterinary school. Erxleben returned to Göttingen in 1770 and began teaching as the first university professor of veterinary medicine, offering a very fine program; but he died prematurely in 1776, ending a very stimulating and valuable influence in veterinary academia. The school he founded was later transferred to Hanover.

Another king-maker in veterinary medicine was the revered Swedish botanist and naturalist Linnaeus, professor of medicine and natural history at Uppsala. He selected Peter Hernquist, who had a fine grasp of science and mathematics as well as being a gifted writer, to be sent to France to study at the Lyon veterinary school and with LaFosse in Paris. Upon his return, Hernquist put forward a proposal for a veterinary institute and hospital in Stockholm. His plan was turned down, so he settled in Skara, where he gained approval to build a school in 1775. During his studies in Paris, he took time to engage in medical studies of venereal diseases. In Lyon he had been very disappointed at the lack of focus on species other than the horse. He practiced medicine as well as veterinary medicine and established a hospital for the treatment of venereal disease. Hernquist had a

wonderful personality, and he made sure that his students were prepared to undertake a leadership role in the communities they settled in. After 33 years, his successor, Sven Norling, established a second school in Stockholm (it was later moved to Uppsala), and the Skara institute became a field station attached to the faculty specializing in research on metabolic and nutritional disorders of cattle, with a wonderful veterinary museum.

#### **PETER HERNQUIST (1726–1808)**

Sent by Linnaeus to Lyon and to LaFosse

Worked as both a veterinarian and a gynecologist

Founded veterinary school for all species in Skara, Sweden, 1775

Trained students for role as veterinarians in rural life

Later his protégé Sven Norling established the second school in Stockholm, with a focus on infectious diseases; later it moved to Uppsala

#### **PETER CHRISTIAN ABILDGAARD (1740–1801)**

Brilliant scholar; sent to Lyon to train in veterinary medicine but had concerns with focusing on only the horse and with the absence of internal medicine

Founded the Danish veterinary school in Copenhagen in 1773; initially a private school, it later became state supported

Established a recruiting scheme for rural veterinarians in 1792

Denmark then followed Linnaeus' example and sent a brilliant polymath student, Peter Christian Abildgaard, to Lyon to prepare to lead a proposed veterinary faculty on his return. He, too, was disappointed to find that the Lyon curriculum was preoccupied entirely with the horse, and he found Bourgelat proud, vain, and insufferable. Even worse, no internal medicine was included in the curriculum, so he had to supplement his studies with extra courses in human medicine and comparative anatomy. He succeeded in getting his stipend extended for two years to allow him to study rinderpest, and he also completed a medical degree. The Danish school was approved, with Abildgaard as the Foundation Professor, in 1773. As the only instructor, Abildgaard had a huge workload at first, and he also had to handle a new wave of rinderpest, which he progressively eradicated. He received the King's support to change the school from a private to a state institution. He had an insatiable appetite for knowledge across fields as varied as natural history, agriculture, veterinary medicine, and medicine; his personal library contained more than 2,000 books in seven languages. Remarkable for his clear thinking and tenacity, he reviewed fungal diseases of crop plants and erred only in disputing the idea that ergot of rye was a fungus. He modified the art of horseshoeing, requiring compe-

tence in his advanced methods for all students, and invented the Danish restraining harness.

Improving the wool quality of Danish sheep by bringing in Spanish merinos was a special interest. When Edward Jenner published his great discovery of cowpox as a vaccine against smallpox, Abildgaard immediately ordered some from England and conducted the first human vaccinations in Denmark. His colleague Erik N. Viborg maintained the momentum of progress by developing an experimental approach to studying infectious diseases such as glanders and strangles in horses.

Before concluding this section, it should be noted that the seed idea of a veterinary profession began most strongly in the mind of one man, Bourgelat, whose view was limited mainly to the perception of a need to provide health care for horses. His own knowledge of the specifics of such a service was extremely limited, but, once it was approved politically, he was able to put the plan into effect. Advisers to powerful leaders of other states observed the initiative in France and selected excellent candidates to go there to train so that they could return to their homelands and develop similar models. Thus an entirely new profession was born and accepted, a "giant step for mankind." It must be noted that Bertin's broader vision of comparative medicine of domestic animals, particularly of agricultural species for food and fiber, was an important extension. This concept was seized upon by European scholars as better suited to their needs in rural areas, despite the importance of the horse as a source of energy for work and transport.

#### **A SLOW START IN ENGLAND FOLLOWED BY A SPREAD ACROSS THE OCEANS TO THE WESTERN HEMISPHERE, TO SOUTHERN AFRICA, AND TO AUSTRALASIA**

England's first veterinary college, in London, had a promising beginning in 1791 with the appointment of an ambitious French graduate of the Lyon school, Vial de Sainbel, who had laid out a plan for a British veterinary education, based in London, with a three-year curriculum. Sainbel was fascinated by the performance of thoroughbred racehorses, which he studied by means of dissections. The outcome of his study was "An Essay on the Proportions of Eclipse," which included anatomical descriptions of Eclipse and three other great racehorses of the time. There was strong support for the London veterinary school from Britain's leading surgeon, John Hunter, a visionary of the comparative approach to medicine. Hunter legitimized surgery by making it a research-based field, even making the first venture into successful transplantation of tissues and performing the first human artificial insemination. He sent a keen young surgeon who was motivated by the idea of veterinary medicine and surgery, William Moorcroft, to Lyon for training, and Moorcroft thus became the first English veterinary surgeon. Hunter gave of his time to help get the London veterinary school started by teaching surgery. After Vial de Sainbel's program for the school was derailed by his tragic death from glanders in August 1793,<sup>b</sup> Hunter arranged for the veterinary students to attend lectures at the London medical schools free of charge. But there was a further tragic loss for the new profession when Hunter died in October 1793.

### **CHARLES VIAL DE SAINBEL (1753–1793)**

Lyon graduate; founded the first school in London in 1791, with a proposed three-year program

Had a passion to correlate anatomical dissection to speed in top racehorses, especially the famous horse Eclipse; author of “An Essay on the Proportions of Eclipse”

Zeal for dissection may have led to his death from *Pseudomonas mallei*, glanders, in 1793

### **JOHN HUNTER (1728–1793)**

London’s leading surgeon of the time and a visionary of the comparative approach to medicine

Strong proponent of London’s veterinary college, where he taught surgery

Transformed surgery into a research-based field; experimented with tissue transplantation

First human artificial insemination

The London veterinary college was then unlucky in its selection of leaders. Sainbel was succeeded by Edward Coleman, a medical man without veterinary training. Coleman lacked the vision and commitment to do more than train advanced military farriers, reducing Sainbel’s ambitious initial curriculum from three years to three months (for a fee of 20 guineas). He had enough influence, however, to obtain an annual government subsidy on the grounds that the veterinary graduates would help stem the massive loss of horses in wars. His main claim to fame was that he persuaded the British Army to appoint his veterinary graduates at commissioned rather than warrant officer rank. He was appointed Principal Veterinary Officer to the Cavalry in 1796, with responsibility for selecting the graduates to be awarded a military commission. The first military veterinary surgeon was Captain John Shipp, commissioned in 1796. The standard of education was in the hands of the medical committee, and no input from veterinarians was considered. Coleman hung on as principal for 45 years, leaving a golden opportunity for a true veterinary leader to arise—and one did: William Dick.

The majority of graduates specialized in equine medicine, as this was the only clinical subject taught in London. After Coleman died in 1839, the long-suppressed veterinary reformers organized an approach to the Privy Council requesting a Royal Charter to be able to confer upon graduates of the London and Edinburgh schools membership in a Royal College of Veterinary Surgeons (MRCVS) under the same conditions as those of the College of Surgeons. The Privy Council authenticated the Royal Charter in 1844, surprising the RVC College Governors and professors. The result was a long period of discord that was not fully resolved until 1881, when the Veterinary Surgeons Act was passed by Parliament.

### **WILLIAM DICK (1793–1866)**

Qualified in London in 1817 through Coleman’s 20-guinea course

Founded Edinburgh veterinary school in 1823; it is now named after him

Sponsored by the Highland and Agricultural Society, Scotland

Required certificates of competence by medical and veterinary examiners

Had a huge impact on veterinary medicine in the English-speaking world

Among the graduates of Coleman’s 20-guinea program was William Dick of Edinburgh, a farrier’s son. He proved to be a visionary for his chosen profession. After returning to Edinburgh, he trained in human anatomy and was hired by the Highland and Agricultural Society (HAS) in 1823 to develop a course of lectures in veterinary medicine. He had been an intense student of the horse while working with his father and was a gifted clinician, reputedly able to diagnose different types of lameness from his office just by hearing the gaits of horses on the cobblestones as they passed. He taught himself hippopathology and used his own funds to found the Edinburgh Veterinary School in 1823 (known today as the Royal Dick). He arranged for the HAS to issue certificates of competence based on the results of evaluation by a competent examining board, initially composed of selected medical professionals plus Dick himself. Dick’s school in Edinburgh was destined to have an enormous impact on the evolution of the new profession in the English-speaking world. Edinburgh at the time was a beacon for medical and scientific scholarship, as well as having a strong focus on agriculture and transport. It was also a leader in setting academic and legal standards that ensured public confidence in graduates, a very important factor in society’s expectations of professional people.

It must be remembered that the period was still pre-Pasteur, and there was still mixed confidence in the idea that microorganisms cause disease. One strong believer was John Gamgee, founder of the second veterinary school in Edinburgh, which produced the great William Hunting, founder of the *Veterinary Record*. Gamgee appointed James Law to his faculty in 1860, and together, in 1861, they produced a fine text on the anatomy of the domesticated animals with a broad coverage of species. Gamgee later moved his Edinburgh school to become the short-lived Albert Veterinary School in London. He was a great innovator and was prepared to challenge many preconceived ideas. After visiting mainland Europe, he reported that only 8% of horses in Paris were lame, compared to a tragic 42% in Britain. He was the first veterinary surgeon to use the rectal thermometer routinely, establishing that fever was a feature of cattle plague, and was a firm believer in infectious diseases, unlike Dick, who was not convinced. He was deeply involved in the development of the first International Veterinary Congress in Hamburg in 1863. He also predicted, with remarkable accuracy, how rinderpest (cattle plague) might be introduced to the British Isles. It happened in 1865.

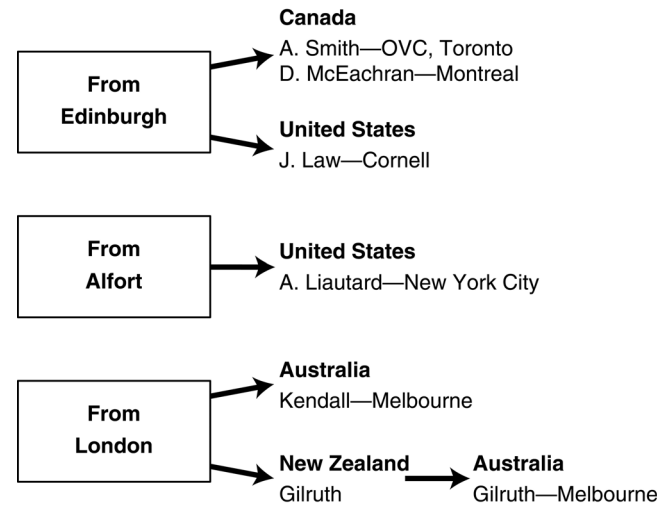
## THE AMERICAS

With the spread of the veterinary concept from Spain (Figure 3), the Universidad Nacional Autonoma de Mexico (UNAM) was founded in 1853 in Mexico City as the first veterinary school of the Americas. At the most recent WAHVM Congress, Cordero del Campillo presented a valuable review of the early history of veterinary knowledge in the Old and New Worlds. In North America, although the perceptive leader General George Washington directed that farrier services must be available for his artillery units in the Revolutionary War as early as 1776, he had to recruit civilians to do the horse-doctoring, management, and hoof care. The cavalry was mobilized the following year, but it was 1792 before a farrier was assigned to each troop. This practice was maintained through the War of 1812 until 1814, when it was dropped. Horses were essential for settling, clearing, road making, lumbering, and farming the new territories and for transport of people and freight, as well as for sport and security. There was an urgent need for farriers and horse doctors. Although the term “veterinary surgeon” appeared in army regulations in 1834–1835, only farriers were available. By 1914, when World War I began, there were 27 million horses, asses, and mules in the United States. After the US-Mexican War of 1845 ended in 1848, the US Army had added a few veterinarians. By 1847 there were about 15 in America, all immigrants from Europe.

During the Civil War about 284,000 horses, many of them unsuitable, were purchased for the 60,000 or so Union cavalry, but only six veterinary surgeons were attached to the Union Army. In 1863 the United States Veterinary Medical Association (USVMA), the forerunner of the AVMA, was established, but the profession was at a very primitive stage, with little regulation, and largely urban. There were about 400 veterinarians, but the number was rising rapidly; by 1900 it reached 8,163, the great majority dealing mainly with equine medicine. In Europe at that time, the veterinary profession was already developing a broad interest across domesticated species. After the initial ventures into veterinary education, which were privately funded, public funding became available after the Morrill Act of 1862. The first Land Grant College to launch a veterinary education program was Iowa State College in Ames, IA (1879). Most of the earlier private colleges withered, with a few important exceptions. Many states took advantage of the land grant program, an enormous boost to the development of the veterinary medical profession. President Lincoln supported and signed the Morrill Act, which established ROTC cadres on those campuses that participated, thereby aiding recruitment for the upcoming Civil War. The University of Pennsylvania’s private veterinary school survived as an outstanding college; Cornell University’s College of Veterinary Medicine (CVM) was unique in being a land grant veterinary school at a private university.

In Edinburgh, Dick died in 1866 at age 77, but his school had spawned some giants for the profession in North America (see Figure 3). Andrew Smith graduated in 1861 and was recruited to become the founder of the Ontario Veterinary College (OVC) in Toronto just the following year. As its principal, he had a major impact on veterinary medicine’s

development in Canada and the United States. It was a long, hard road. Initially, to ensure the school’s survival, Smith lowered standards and shortened the course until the school was finally secure enough to attain the desired quality. The OVC moved from Toronto to Guelph in 1923, eventually becoming incorporated into the new University of Guelph and evolving into a leader among veterinary schools.



**Figure 3: The spread of the meme to North America, South Africa, and Australasia**

In 1868 James Law, an Edinburgh classmate of Smith, was selected personally by President White of Cornell University in Ithaca, NY, to become the first professor of veterinary medicine in the United States. Law was a great scholar, having authored with John Gamgee two well-illustrated volumes on the anatomy of the domestic animals in 1861. In 1900 he completed his five-volume masterpiece, *Veterinary Medicine*. Smith and Law had an enormous impact on the development of veterinary medicine in Canada and the United States respectively. Law assembled an outstanding faculty and developed an excellent curriculum for training veterinarians. Daniel Elmer Salmon was the first Cornell University graduate in veterinary medicine and in 1876 was the first Doctor of Veterinary Medicine to qualify in the United States. In 1883 Salmon founded the Bureau of Animal Industry (BAI) within the US Department of Agriculture as a research arm of veterinary medicine in the service of agriculture. International embargoes on American swine and pork products because of the risk of *Trichinella* parasites, plus the threats to the swine and beef industries from hog cholera and Texas cattle fever, led to the development of the first microbiological research laboratories. Salmon recruited outstanding scientists to the BAI, including Theobald Smith, Fred Kilborne, and Cooper Curtice. They learned from European advances in bacteriology and parasitology and became the leading edge of infectious and parasitic disease research, human and animal alike, worldwide, true to the goal of comparative medicine. The discovery of viruses as causes of disease at the beginning of the twentieth century gave another huge boost to support for veterinary research, along with immunology and vaccinology.

### **JAMES LAW (1838–1921; DICK GRADUATE, 1861)**

Was selected by President White of Cornell University to become the first professor of veterinary medicine and founder of the veterinary school in 1868

Author, with John Gamgee, of the two-volume publication *Anatomy of Domestic Animals* (1861)

Author of the five-volume publication *Veterinary Medicine* (1900)

### **DUNCAN MCEACHRAN (1830–1919)**

Founded a private veterinary school in Montreal, known as the Faculty of Comparative Medicine and Veterinary Science, that was affiliated with McGill University

The school closed in 1902 and was later turned over to French Canadians, who finally developed it as part of the Université de Montréal under F.T. Daubigny (1920)

Recruited William Osler, the inspiring medical scholar who led the school to the forefront of comparative medical teaching and research before becoming the leading figure in medical scholarship worldwide

Appointed Canada's first Inspector of Stock

Regulated import of stock, quarantine, and TB testing

A third of Dick's graduates, qualifying the year after Smith and Law, was Duncan McEachran, who emigrated to Canada, where he engaged in practice and briefly helped Smith in Toronto. He then moved to Montreal, where he founded a private veterinary school for which he set very high goals. He recruited to his faculty William Osler, a most inspiring teacher, who went on to become arguably the greatest medical leader of his era. Osler named McEachran's school the Faculty of Comparative Medicine and Veterinary Science. While working with veterinary problems in Montreal, Osler, an ardent comparative pathologist, identified a parasitic pneumonia causing coughing in hunt dogs (now attributed to *Filaroides osleri*) and the viral disease of pigs that became known as hog cholera. He did not discover the cause of heavy losses from "Pictou cattle disease" in Nova Scotia, thought to be of an infectious nature (later, with input from John Anderson Gilruth in New Zealand, it was shown to be due to ragwort poisoning). The Montreal school was ahead of its time, and McEachran encouraged the development of a school for French-speaking students, which eventually replaced the English-language school. The transition to French-Canadian management went through several fractionations before settling on Victor Daubigny; he was succeeded by his son, François T. Daubigny, who led the school through attainment of AVMA accreditation and incorporation into the Université de Montréal, with the new name École de Médecine Vétérinaire de l'Université de Montréal, in 1920. The school was eventually based in Ste-Hyacinthe. The original McGill school closed in 1902.

McEachran, a true visionary, recognized the great potential of the cattle industry; in 1880 he went west, formed a partnership, and established the Walrand Ranch. He was appointed Canada's first Inspector of Stock and demanded quarantine and inspection facilities for all imported animals. The Contagious Diseases Act of 1879 allowed quarantine measures to be implemented. Inspection of cattle entering western Canada from Montana was implemented in 1884. McEachran introduced the tuberculin test for a population-based plan to eradicate tuberculosis from cattle. He achieved his goal of establishing a quarantine station for animals arriving in Canada from overseas.

Another branch of the spreading veterinary meme derived more directly from Bourgelat's influence. A Parisian veterinarian, Alexandre François Liautard, who attended the Alfort School from 1851 to 1855 before allegedly being dismissed for a "disciplinary infraction," was admitted by the Toulouse school and allowed to complete his qualification in 1856. In 1860 he emigrated to the United States and salvaged the failing New York City College of Veterinary Medicine. He left in 1875 to form the new American Veterinary College and Hospital, taking most of his students with him. His program was a beacon for advancing urban veterinary medicine, strong in equine and canine medicine and surgery. He was a strong proponent of the establishment of the USVMA in 1863 and supported its maturation into a national body, the AVMA, in 1898. In 1877 he became editor of the *American Veterinary Review*, which provided an overview of developments in veterinary science worldwide. He was its proprietor and publisher from 1881 to 1900 and continued to write a monthly feature, after he retired and returned to France, until he died in 1918. Liautard played a huge role in advancing his profession in America and giving it a global flavor appropriate to the New York City environment. His school provided a balance for the New York State Veterinary College at Cornell University, a land grant college under the Morrill Act with a strong focus on livestock agriculture and state-of-the-art scientific research.

### **ALEXANDRE FRANÇOIS LIAUTARD (1835–1918)**

Trained at Alfort and Toulouse

Founded American Veterinary College and Hospital in New York in 1875

Editor of American Veterinary Review

Strong supporter of the establishment of the USVMA in 1863, which became the AVMA in 1898

### **SOUTH AFRICA**

Another manifestation of the veterinary meme and its global spread was displayed by Arnold Theiler, one of the truly creative scholars in the veterinary profession. Theiler was a Swiss veterinarian who qualified at the University of Berne, then completed a doctorate at Zurich and gained experience at Munich. He was an avid learner. He emigrated to South Africa, settling in Johannesburg in 1891. Tragically, he lost his left arm in an agricultural accident. However, his talent was recognized, and in 1896 President Paul Kruger assigned him to gain control of the devastating epidemics of rinderpest in cattle and glanders in horses. A brilliant organizer and

apolitical, he worked first for the Boers and then, after the Boer war, for the British as Chief of Veterinary Bacteriology for the Transvaal. He saw himself as a scientist and a professional. In recognition of his dedication and achievements, the University of Berne awarded him a doctoral degree. Ever at the cutting edge of research, he showed in 1900 that African Horse Sickness was due to a filterable virus. He also established that East Coast Fever was due to a hemoprotozoan parasite, which came to be named *Theileria parva*. He worked with Stewart Stockman, the British veterinarian who later established the Central Veterinary Laboratory at Addlestone near Weybridge, Surrey, which became the keystone of Britain's defensive wall against animal disease. Theiler was a world-class biomedical problem solver: he demonstrated that phosphorus deficiency of range cattle led to bone chewing and botulism and identified many other infectious and toxic conditions. In 1908 he founded the South African Veterinary Research Institute at Onderstepoort, north of Pretoria, leading it to world renown for its veterinary research. He taught at the veterinary faculty at Transvaal University College beginning in 1920, serving as dean from 1923 to 1927. With over 300 publications to his credit, he stands very tall in the annals of veterinary medicine. It has been noted elsewhere that veterinary medicine was one of the most successful activities carried out by colonial governments, although the topic has not received due attention from many historians.

A second distinguished Swiss-born veterinary genius was Karl F. Meyer (1884–1974) of Basel, who graduated from the University of Zurich, a program strong in bioscience and history, in 1905. Meyer worked for Professor Heinrich Zangger, who taught Comparative Pathology and Physiology and was an authority on legal medicine. This work introduced Meyer to veterinary medicine via comparative medicine and the work of Pasteur, Koch, Loeffler, Frosch, Nocard, Roux, Ellerman, and Bang—a very inspiring adventure. Meyer's interest was captured by rabies, anthrax, bovine tuberculosis, foot-and-mouth disease, bovine pleuropneumonia, and the role of a cancer virus in avian leukosis. The work of Salmon and Smith's team at the BAI in the United States on hog cholera, Texas fever, and anaplasmosis likewise captivated him. Meyer moved to Munich for Kitt's courses on veterinary pathology and worked in F. von Muller's lab on experimental models of disease. He then attended the University of Berne and completed his qualification as a veterinarian with a thesis in 1909 under the supervision of Professor W. Kolle, who had worked with Robert Koch and spent many years in South Africa. Kolle recommended Meyer to his friend Theiler in South Africa for post-graduate studies focusing on protozoology and epidemiology. Koch had worked in Dar es Salaam, in German East Africa, on malaria and East Coast Fever. Theiler put Meyer to work on East Coast Fever, and he demonstrated its transmission via the spleen and its life cycle. Meyer accumulated a remarkable knowledge of tropical disease pathology, immunology, and epidemiology via his enthusiastic interaction with Theiler over just three years. He contracted a very severe form of malaria and was treated with salvarsan, returning to Switzerland to recover.

Spreading the meme, a former British ambassador to the United States recommended Meyer to the University of Pennsylvania's School of Veterinary Medicine, where he was appointed and was made a professor within a year

(1911). An incredibly prolific teacher and researcher, he produced a steady stream of research papers on infectious diseases of people and animals. He began working on viral diseases in 1914. Equine encephalitis, the major zoonotic disease across the plains states and the west, became a major preoccupation; he revealed the causative virus in 1930. By that time Meyer had moved to the University of California, first at Berkeley, then, in 1915, at the Hooper Foundation at UC San Francisco. He became an American citizen in 1922, but if any man deserves the title of world citizen for his contributions to the ecology of human and animal health over the full compass of disease, it would surely be Karl Meyer. Hardly a disease anywhere on the planet escaped his interest and significant contribution. His work encompassed influenza, brucellosis, rabies, botulinus, tetanus, bubonic plague, and all forms of zoonotic disease and host resistance. His was a mind both encyclopedic and penetratingly analytical, as witness the extraordinary list of his honorary degrees from both the Old World and the New.

## AUSTRALASIA

The settlement of Australia shows the key points of entry from ship to shore, bringing human and domestic animal pathogens to a pristine new land peopled only by ancient Aboriginal tribes. An introduced carnivore, the dingo, had also arrived from southeast Asia; its origin and accompanying biota are not well understood. Two remarkable graduates of Dick's Edinburgh veterinary college who emigrated to Australia had a major impact on the spread of a dynamic version of the veterinary meme there. The first was Graham Mitchell, who graduated in 1854, sailed for Australia, and worked as a pound-keeper while setting up a veterinary practice in Melbourne. Very observant and pro-active by temperament, he diagnosed foot-and-mouth disease and recommended immediate slaughter of the affected herd in 1872. He introduced inoculation of cattle against pleuropneumonia and asserted that "Cumberland Disease" was in fact anthrax. He helped the medical profession develop a local vaccinia vaccine. He organized support among pastoralists for a plan to establish legal recognition for qualified veterinarians and promoted the idea of establishing a seat of learning in veterinary education. As Honorary Veterinary Surgeon to the Agricultural Society of Victoria from 1872, he obtained their support for a resolution to that effect. However, despite a petition and strong support from prominent citizens, it failed to obtain government approval.

The second "carrier" of the meme was William Tyson Kendall of England's Lake District, an 1873 graduate of the Royal College of Veterinary Surgeons. After practicing in Britain for several years, Kendall emigrated to Australasia in 1880, originally intending to go to New Zealand but then deciding to stay in Victoria. His ideas coincided with those of Mitchell. Both men were driven by some inner urge and motivation to mobilize the profession and create an environment for creative excellence. They agreed that a veterinary educational institution was a necessity. Kendall and Mitchell collaborated in soliciting support and, within a year of Kendall's arrival, succeeded in consolidating professional support to create a veterinary association. They then joined forces with a government veterinarian in South Australia, Thomas Chalwin, to edit Australia's first veterinary journal, the *Australian Veterinary Journal*. They lobbied hard for funds to create veterinary education facilities and for

legal recognition of graduates. Initially there was little support from government bodies or from the city of Melbourne. Kendall decided that the only solution was to establish a private school as a starter, in the hope that the government would take it over once it was established. Kendall purchased a site in Fitzroy and modified the premises by 1886 to serve as a base for his Melbourne Veterinary College. He often had to purchase his patients, then sell them after they had been treated and recovered. Kendall persuaded the Veterinary Association of Victoria to apply for a Veterinary Surgeons Act, which he drafted. Parliament debated it, modified the wording to require four years of training instead of three, and in 1887 approved it, making it the longest training program in an English-speaking country at the time. Mitchell learned that his dream of creating a veterinary college had finally been realized by Kendall, with supporting legislation ensuring that the graduates would be given legal recognition as practitioners. He died of a heart attack in 1888. In 1909, the University Act provided for the establishment of the University of Melbourne Veterinary School.

Another carrier of the meme, James Douglas Stewart, originally from New South Wales, received his MRCVS from Edinburgh's Royal Dick veterinary school in 1893 before returning to Australia. After working for the Department of Agriculture, Stewart began a campaign to create a veterinary school at the University of Sydney, eventually gaining the support of the state government and the university senate. In 1909 he was made Chief Inspector of Stock; the following year he was appointed Professor of Veterinary Science and worked feverishly to establish the veterinary school, just one year after Melbourne upgraded Kendall's school to university status. The result was a broad-based school at two locations, Sydney and Camden, to cater to urban and rural interests respectively, with a powerful academic core at the university. Stewart "reigned" over the Sydney faculty he had created for three decades. He had a great talent for detecting and recruiting people of excellence. He established strong links with Commonwealth Scientific and Industrial Research branches that evolved into the elite Commonwealth Scientific and Industrial Research Organization (CSIRO), with many sub-divisions including the McMaster Laboratory in global and wildlife research, located in Australia's capital, Canberra. Other academic centers grew in Armidale, NSW; Brisbane, Queensland; Adelaide, South Australia; and Perth, Western Australia. Stewart arranged the admission of students from two "minority groups" that lacked access to veterinary education: New Zealanders and women. He retired in 1939 and was succeeded by Ian Clunies Ross, who led the school through World War II before retiring to become chairman of the CSIRO.

Yet another carrier of the veterinary meme to Australasia was John Anderson Gilruth. Gilruth was a Scotsman, educated in Glasgow and London, where he received his MRCVS, who emigrated to New Zealand in 1893. In 1895 he was made Senior Veterinarian, Division of Veterinary Science, of the New Zealand Department of Agriculture. In that capacity he noted the deteriorating status of animal health, identifying anaerobic clostridial diseases, bovine tuberculosis, contagious abortion, facial eczema, anthrax, and hydatid tapeworm-related problems. Swine fever broke out in 1895, and Gilruth instituted a slaughter policy that

succeeded in eradicating it by 1900. He also showed that anthrax was being imported in bones from India and controlled that problem. He got a Stock Act passed in 1908 that provided a legal basis for addressing most animal health issues and introduced a nationwide meat inspection system run by veterinarians. The New Zealand government sent him to the Pasteur Institute in Paris for post-graduate studies. On his return he set up the first veterinary microbiology laboratory in Australasia; initially located in Government House, Wellington, it was later moved to Wallaceville, 20 miles north of Wellington (after Gilruth left a few rotting carcasses in the original lab one hot weekend!). In 1908, he was appointed Professor of Pathology and Dean of the Melbourne faculty in Australia, leaving a strong record of accomplishment in New Zealand. He brought with him to Melbourne one of his top New Zealand students, H.R. Seddon, as an assistant who was destined to carry forward the quest for excellence.

Gilruth also brought an inspiring tradition of problem solving and applied research on animal disease, which he passed on to faculty, staff, and students. He worked extremely hard under difficult conditions and achieved a remarkable launch for the newly established university faculty in Melbourne. In three years he "infected" the faculty with his enthusiasm, motivating them to tackle the country's animal health problems. His impact is recorded in the accomplishments of colleagues, including James Douglas Stewart, Dean of the Faculty of Veterinary Science, University of Sydney; Lionel Bately Bull, second Chief of Division of Animal Health and Nutrition, CSIRO, and Head of the Institute of Medical and Veterinary Science, Adelaide; Harold William Bennetts, Chief Veterinary Officer, Western Australia; and Sir Ian Clunies Ross, Chairman, CSIRO. All carried forward the light of learning through applied veterinary research to outstanding levels to protect the nation's livestock and the public's health. In 1912 Gilruth resigned to become the first administrator of Australia's Northern Territory. Later he became the first Chief of the Division of Animal Health and Nutrition of CSIRO. These were the individuals who made possible the exponential growth of Australasia's healthy cattle and sheep industries.

#### **SOME REMARKABLE CONTRIBUTING VETERINARIANS**

In addition to the leaders who created the visionary programs, a few others whose scientific contributions were remarkable should be identified, as a continuing stimulus to the creative potential of the profession to blaze trails in comparative medicine. One cannot conclude without mentioning names that resonate with extraordinary achievements, such as Jean-Baptiste Auguste Chauveau (1827–1917), who researched the physiological underpinning of internal medicine and the very nature of infection and host resistance at Lyon; Alcide Railliet (1852–1930) at Alfort, who awakened and spread the veterinary biology of pathogenic parasitology; and Ferenc Hutyra (1860–1934) and Josef Marek (1868–1952), who distilled and added to the rapidly evolving fields of microbiology, immunology, pathophysiology, and internal medicine at Budapest.

#### **CONCLUSION**

Four factors stand out as vital to the remarkable speed with which the grand and powerful idea of creating a new profession of veterinary medicine spread throughout the

world. First was the magnificent generation of the idea of veterinary education, coupled to the powerful motivation of its insightful originator, Bourgelat, and his proven skill in teaching equestrian management and riding. Second, there existed at the time a tremendous perceived social need for improved animal health, initially for military purposes, traction, and transport, later for issues of food and fiber production, a factor that continues to evolve today, with the increasing focus on animal behavior and welfare, zoonotic diseases, and man-made hazards and an ever-growing demand for companion animal care. Third was the essential support of political leaders with the power to launch the vision that had been generated. Fourth, the meme was sustained by highly talented and dedicated individuals who modified and improved the original idea to allow for its continuing renewal and growth at the cutting edge of biomedical evolution. These four factors have surely been the essential underpinnings of the dynamic progression of the new profession of veterinary education.

## NOTES

- a See *J Vet Med Educ* 30(2), 2003.
- b Glanders is primarily a disease of equidae, but humans are susceptible if the causative agent, now known as *Pseudomonas mallei*, gains entry via the skin or respiratory tract.

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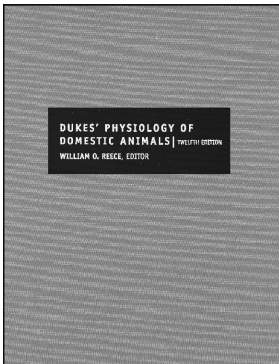
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