

Zweig

A report from the
Harry M. Zweig
Memorial Fund for
Equine Research at
the College of
Veterinary Medicine
at Cornell University

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Franklin M. Loew

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Franklin M. Loew '65 Takes Vet School Helm

There's no doubt about it. An avid horse lover is now at the helm of the College of Veterinary Medicine at Cornell.

Franklin M. Loew (Cornell B.S. '61, D.V.M. '65), Ph.D., the former dean of the Tufts University School of Veterinary Medicine, became the eighth dean of the College of Veterinary Medicine on September 1, 1995. In an article about his new appointment, the *Boston Globe* described Loew as going from "one of the newest and smallest vet schools in the country to the oldest and perhaps the wealthiest and most prestigious: his alma mater."

Growing up in Syracuse, Loew realized his destiny the first time he rode a horse at the tender age of eight. ▶

Loew *continued from page 1*

"I knew right then there was no other life for me other than one that involved horses," recalls Loew, now 56. "They have been part of my life ever since."

As a boy, Loew worked in a local stable—mucking stalls, cleaning tack, brushing, and exercising and showing horses—after school, on vacations, and during summers. He also rode frequently in the New York State Fair Horse Show. He attended a boys' camp in northern Pennsylvania to learn more about horses "and ended up running the whole horse program for years and years," he says.

"I was involved not only in hunting and jumping, which were my preferred equine activities, I also became interested in standardbreds and standardbred racing. After all, the standardbred is the only horse breed developed in New York State."

Horses continued to be part of Loew's life during his undergraduate years in Cornell's College of Agriculture and Life Sciences. His interest took a turn, however, during veterinary school. In 1963, between his second and third years, an inexperienced horse reared and tripped over Loew, who suffered a fractured and dislocated right hip.

"That summer, I had an epiphany," he recalls. "I rethought my involvement with horses and decided not to expose myself to the risks inherent in working with them. I decided my interaction with horses would subsequently be from a research standpoint."

The following year, Loew met Mary Moffatt, a librarian in Cornell's Uris Library, who would eventually become his wife. The couple has two sons, Timothy, a banker, and Andrew, a sophomore at the University of Chicago.

After receiving his D.V.M. in 1965, Loew worked for several years as a research scientist and then entered the doctoral program in physiology and pharmacology at the University of Saskatchewan. Graduating in 1971, he remained at the university as a professor of physiology, directing the Animal Resources Centre and a research program in toxicology. His primary work revolved around studying the safety of canola oil, one of Canada's greatest agricultural success stories.

"As veterinarians, our job is to prevent and relieve the ills and pains of horses. There should be no mistake about it—that's our number one business."

In 1977, Loew moved to Baltimore to become the director of comparative medicine at the Johns Hopkins School of Medicine, remaining there until 1982. Among other projects, he studied animal nutrition and published numerous papers relating to horses, particularly the physiology and metabolism of thiamin (vitamin B1) and its connection to performance and roaring in horses. He also served on a committee that was spearheading a new veterinary school for New England. Based at Tufts University, the new school opened in 1979. Loew became its second dean three years later.

Loew is credited as being the driving force behind transforming the then-fledgling vet school into a burgeoning institution with a national reputation in innovative veterinary education, equine sports medicine, international veterinary medicine, wildlife rehabilitation, biotechnology, and formal programs on ethics and values. Under his wing, the college launched a capital campaign that brought in between \$40 million and \$50 million. The Franklin M. Loew Veterinary Medical Education Center, the centerpiece of the veterinary school campus at Tufts, will continue to honor his achievements.

As chair of the Zweig Committee, Loew sees the Zweig Fund as having a twofold mission. "One, we need to do whatever it takes to make the life of horses better. As veterinarians, our job is to prevent and relieve the ills and pains of horses. There should be no mistake about it—that's our number one business.

"Our other mission is to be supportive of the equine industry by encouraging people to invest emotionally and financially in horses by making New York an even more horse-friendly state through health, breeding and safety programs, and better understanding the diseases of horses."

When not serving in his professional capacities, Loew is an avid reader and collector of antique books from the 18th and 19th centuries, particularly books on horses, veterinary medicine, and selected periods of American history. He also plays the acoustic guitar and is a "reasonably well-informed consumer of acoustic music." In his "free" time, he is writing his third book, a personal memoir focusing on how he believes the moral status of animals has evolved since World War II. ■

Zweig Fund Fuels the International Horse Genome Project

Over the past decade, progress in mapping the human genome has exceeded the expectations of even the most optimistic proponents of this mammoth project. Riding on the coat tails of the Human Genome Project have been smaller, but no less productive, efforts to map the genes of agriculturally important animals, such as cattle, sheep, and pigs.

Now it's the horse's turn. Bred for centuries for speed, endurance, and courage, what better species than the horse for determining the genetic basis of these mercurial traits?

The accelerated progress in gene mapping has been caused principally by two important factors. First, there has been an unprecedented high level of cooperation among the laboratories conducting this work around the world. Second, the development of new technologies and scientific instruments has automated many of the laborious tasks associated with this research. It is likely that the budding Horse Genome Project will benefit from both of these factors.

In October 1995, the world's finest horse geneticists were brought together in Lexington, Kentucky, at the First International Equine Gene Mapping Workshop convened by the Dorothy Russell Havemeyer Foundation, Inc. The continuing annual workshops and the international cooperative research effort have been spearheaded by Doug Antczak, director of the James A. Baker Institute for Animal Health at Cornell's College of Veterinary Medicine, and his colleague at the University of Kentucky, Dr. Ernie Bailey. Thanks to a grant from the Zweig Memorial Fund, Antczak and Cornell have become part of a five-year, multi-laboratory consortium involved in this research. Laboratories from California, Kentucky, Texas, England, France, Sweden, Switzerland, and Japan are also participating in the project.

Cornell's efforts are currently focused in Antczak's laboratory. There, a re-



Doug Antczak

search group that includes a veterinary geneticist, Dr. Chris Davies, plus technicians and veterinary students, has taken on the task of identifying powerful genetic markers called *microsatellites*. Microsatellites are highly variable, or *polymorphic*, DNA sequences that are scattered randomly throughout the genes of all species that have been investigated.

Because of their abundance (perhaps 100,000 altogether) and their variability, microsatellite patterns provide genetic fingerprints of individuals. These fingerprints can be used to pinpoint a particular region of a chromosome carrying a gene that determines a trait of interest, such as coat color or disease susceptibility. This pinpointing process is called *linkage analysis*, and hence, the gene maps created using microsatellites are called *linkage maps*.

The information in the linkage map of the horse will be joined with that from a *physical map*, which places

genes of known function, such as the oxygen-carrying molecule hemoglobin, at particular locations on the chromosomes. Different subsets of the Horse Genome Project laboratories are cooperating on the linkage and physical maps. The complementary information from the two types of map will be joined to form the final gene map of the horse.

There are many practical applications of the information in a genetic map that could benefit the horse industry. Cracking the equine genetic code could allow breeders to select stallion-mare pairings that would prevent the occurrence of genetically determined diseases such as severe combined immunodeficiency disease (SCID) in Arabians, epitheliogenesis imperfecta (EI) in Arabians and American Saddlebred horses, and hyperkalemic periodic paralysis (HYPP) in Quarter horses. Breeders could also select more easily for traits of special interest, such as coat color.

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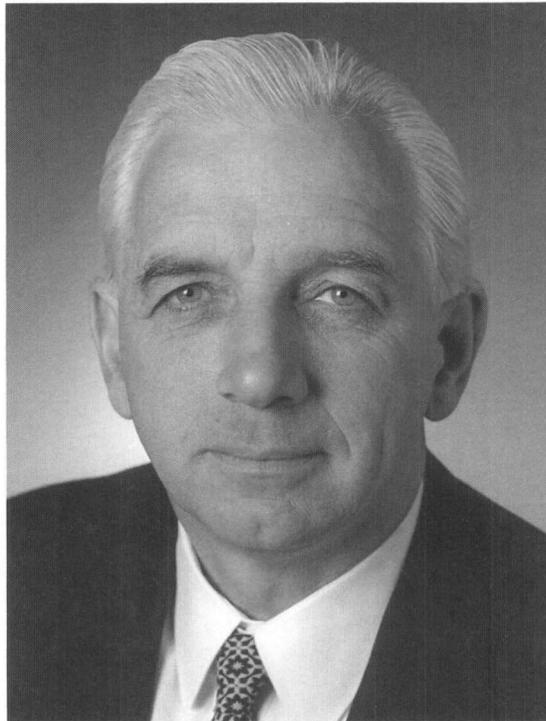
Bilinski Chairs Racing and Wagering Board

As an equine veterinarian in the Albany area for more than 25 years, Jerry Bilinski '69, the Chair of the New York State Racing and Wagering Board since May 2, 1995, is familiar with the issues facing the board, particularly as they relate to horse racing.

These issues include:

- The use of Lasix: Bilinski supports the use of this medication, which helps curb bleeding in race horses during racing. It was approved for use in New York as of September 1, making the state the last in the country to allow its use. "I'm not, however, in favor of advocating the use of other medications at this time. They all require much more research."
- State breeding program: "I felt New York will never be Kentucky and that to benefit the New York breeding farms, a greater degree of restrictiveness will be required in our program. The changes made last fall will sunset and, at that time, I am sure proper evaluation will decide in what direction the state will go."
- Gaming: Bilinski thinks that allowing casinos beyond Indian lands is probably inevitable but that such gaming does not mean trouble for horse racing. He is confident the industry will be able to thrive despite the competition.
- Off-track betting: Although many people express concern about simulcasting and OTB, Bilinski believes that "both could be very beneficial to racing if managed in a cooperative manner. We hope to see some changes in this direction in the future."

Bilinski, 51, who succeeds Richard Corbisiero as chair of the Racing and Wagering Board, grew up on a 110-acre cattle farm at Coons Crossing, northwest of Mechanicville in upstate New York. Fascination with the veterinarians' visits and a "deep-seated love and attraction for animals" set



Jerry Bilinski

Bilinski's sights on veterinary science by high school. "I think what really turned the tide was when my father gave me a baby calf to raise when I was about 16."

He earned a B.S. degree at the College of Agriculture and Life Sciences (1967) and his veterinary degree at the College of Veterinary Medicine (1969), both at Cornell. After college, he worked in several equine veterinary practices in upstate New York. In 1979, he opened his own equine practice in Chatham. In addition to operating his practice, he has been in the breeding business since 1974, owning several broodmares. His farm also stood the stallions Cormorant and Go and Go.

As chair of the Racing and Wagering Board, which recently moved its executive office from Manhattan to Albany, Bilinski oversees 11 race-tracks, six off-track betting corporations, bingo games sponsored by about 2,500 organizations, and other games of chance operated by licensed, authorized nonprofit organizations as well as the casino on the Oneida Indian Reservation. These activities generate about \$5 billion

annually in legal wagering, which supports the employment of thousands of state workers and provides tens of millions of dollars in revenues to local and state governments.

Bilinski's new position also makes him a member of the Zweig Memorial Fund committee. Each year, horse racing in the state generates approximately \$400,000 for the fund, which the committee disburses among Cornell veterinary scientists engaged in equine research.

As a member of the Zweig committee, Bilinski says he "hopes to be able to use my many years of practical veterinary experience along with my new position in state government to help steer future areas of scientific research that they might help the racing and breeding industry in New York." He is interested in more research on the use of medication on the race track, particularly Lasix, and how the drugs might affect the equine athlete.

On the personal front, Bilinski is married to Darlene Bilinski, with whom he has an infant daughter, Annie. He also is the father of a 16-year-old daughter from a previous marriage.

Growing up in northern New Jersey, the only animal Pat Wehle ever really thought about was her cocker spaniel. But a blind date in college changed that when she met her future husband Ted Wehle. Thanks to that chance meeting, she has spent the nearly three decades since she left college working on a 900-acre horse breeding farm.

"Horses must have been my fate," muses the 47-year-old Wehle. "And all because of a blind date."

The Wehles married right after college and moved to the Wehle Stock Farm, Ted's family's standardbred breeding farm in upstate New York. Pat recalls that, compared to the suburbs of New Jersey, it seemed like the wilderness. The 60-horse spread is in Scottsville, just outside Rochester, and was established by her in-laws back in 1935.

At first, Pat helped her mother-in-law, Betty Wehle, who was running the breeding end of the farm. Over the past three decades, however, she has gradually taken on her mother-in-law's role. Her days are hectic, helping farm manager Dan Burstein oversee six to eight seasonal employees, tend to the brood mares, and deliver foals. She also sometimes travels with Ted, who is now chairman of the board of the Genesee Brewing Company.

Among the farm's many successful horses were Land Grant, the richest two-year old in the history of standardbred racing in the mid-1980s; Amneris, the fastest two-year-old ever of her time; and Final Score, a highly successful stallion living in Ohio.

"Over the years, we were using the vet school—the College of Veterinary Medicine at Cornell—so much that we became friendly with some of the vets. Finally, about 20 years ago, I started getting involved with the college," recalls Pat.

She joined the college's Equine Advisory Council, eventually becoming its first female chair. The council works



"Running the farm is a cooperative effort," says Pat Wehle (left), who works alongside her mother-in-law, Betty Wehle, and farm manager Dan Burstein.

on the public image of the college and assesses the college's effectiveness in meeting the needs of the horse industry. It also played an important role in developing the new curriculum. In her early years on the council, the big health problem facing the horse industry was equine infectious anemia.

"Today, it's rabies," she says.

"As a member of the committee, my role is to carefully read all the requests and help select a balance of projects that represent the interests of breeding versus racing versus the whole horse industry."

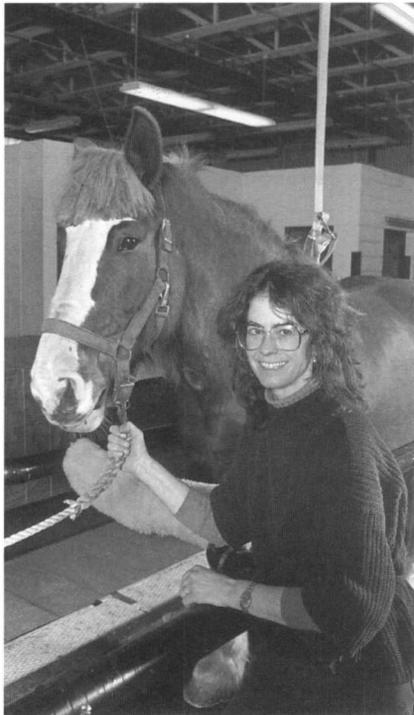
In 1989, Wehle's growing expertise in breeding resulted in an invitation to join the Zweig Committee. "It's very interesting to review all the paperwork for the committee and to see the kinds

of projects being thought about on the cutting edge of research," she says. "As a member of the committee, my role is to carefully read all the requests and help select a balance of projects that represent the interests of breeding versus racing versus the whole horse industry."

Wehle is also active with several charitable organizations. She is the chair of the board of Park Ridge Health System, a 700-bed health care organization, and co-chair of its \$14 million capital campaign. She also is president of the Rochester Female Charitable Society, the oldest charitable institution in the U.S. Founded in 1823, the society, through a private foundation, distributes money to the sick and the poor. Through social workers' requests, the society funds projects such as medication or transportation for a needy patient.

The Wehles have two grown daughters who, like their father, grew up on the horse farm and are actively involved in horses. Carolyn is now in college and wants to train horses when she graduates. Elizabeth does public relations work for a national museum in Rochester. ■

Dr. Beth Valentine Studies Link Between Metabolic Defect and Muscle Weakness



CHARLES HARRINGTON

Dr. Beth Valentine

After lameness, equine rhabdomyolysis—commonly known as “tying up” and “Monday Morning Disease”—is one of the most common problems impairing the ability of horses to perform and exercise. Affected horses may experience muscle cramping and weakness after exercise, tremble, become intolerant to exercise, perform poorly, walk stiffly, and undergo muscle atrophy, especially under stress. In severe cases, they can suffer extensive muscle and kidney damage and even death.

“Typically, veterinarians have considered tying up as a husbandry problem, and have recommended that owners reduce the grain in afflicted horses’ diets. But this treatment has had only minimal benefits,” says Beth A. Valentine, D.V.M., Ph.D., an assistant professor of pathology in the College of Veterinary Medicine. “We have evidence, however, that this condition may be a metabolic disease that impairs the horse’s ability to use carbohydrates properly for muscle energy.”

Specifically, the condition is thought to be related to an abnormal accumulation of glycogen—a storage form of the energy-producing carbohydrates—within the locomotory muscles.

This disorder, known as Equine Polysaccharide Storage Myopathy (EPSM), was identified in Quarter Horses and Quarter Horse-related breeds—including Quarter Horse crossbreds, Paints, and Appaloosas—by Dr. S. J. Valberg in 1992. Valberg, a veterinarian now at the University of Minnesota, linked the condition to a particular muscle lesion visible under a microscope.

Since that time, Dr. Valentine has identified the same abnormality in a wide range of breeds, including the Norwegian Fjord Horse, Standardbred, Thoroughbred, Arabian, Belgian-light horse cross, Warmblood, Morgan, and Percheron-light horse cross.

“Clinically, this disease may have varied manifestations, from weakness and muscle atrophy to ‘classic’

“This defect, we suspect, results in an ‘energy crisis’ which leads to muscle weakness, cramping, and muscle necrosis.”

rhabdomyolysis. But some horses experience sudden onset of recumbency and even death without prior clinical signs,” explains Valentine. “What these horses have in common, however, is the presence of an abnormal accumulation of glycogen and the exclusive involvement of the type 2 muscle fibers that use glycogen for energy.”

With muscle biopsies, Valentine has been able to identify the characteristic lesions that previously have been easy to miss because she and others did not know what to look for. “We now believe these lesions indicate this is a long-term disease process whether horses show clinical signs or not,” she says.

She suspects that affected horses cannot derive sufficient energy from their muscle glycogen during exercise because of a defect in their glycogen metabolic pathway. “This defect, we suspect, results in an ‘energy crisis’ which leads to muscle weakness, cramping, and muscle necrosis,” she says. She adds that the clinical signs of tying up are believed to be only the “tip of the iceberg” in horses that suffer repetitive exercise-induced muscle injury.

With a new grant from the Zweig Memorial Fund, Valentine is conducting an in-depth analysis of rhabdomyolysis and EPSM. She is recruiting horse owners who think they have a horse with this condition. So far, she has at least 12 horses in the study, with another eight or so partially participating.

Using state-of-the-art biochemical assays, Valentine and collaborator Salvatore DiMauro, an M.D. at the College of Physicians and Surgeons at Columbia University, will examine the level of enzymes involved in glycogen metabolism in muscle samples from affected horses. She and DiMauro, who is a world expert in glycogen storage problems among humans, are hoping to identify a specific metabolic defect.

She is also studying the effects of feeding a high-fat, low-carbohydrate diet to affected horses. This diet was developed in collaboration with Cornell nutritionists Dr. Arleigh Reynolds and Dr. Harold F. Hintz. Typically, horses consume diets with only one to four percent of total calories from fat. They obtain their main source of energy from the carbohydrates in grains and ▶

Harry M. Zweig Memorial Fund for Equine Research—1996 Research Awards

\$43,079 to Dr. Douglas Antczak for the "Horse Genome Project."

\$49,237 to Dr. Barry A. Ball for "Gamete Physiology, Fertilization, and Embryonic Development in the Horse."

\$8,674 to Dr. Barry A. Ball for "Morphometry of Stallion Spermatozoa Via Computer-Assisted Image Analysis: Relationship of Measured Parameters to Fertility."

\$49,869 to Dr. Peter Daels for "Ontology of Luteal and Feto-Placental Steroidogenesis During Early Pregnancy in Mares."

\$9,700 to Dr. Douglas McGregor for "Career Development Training for Equine Research Scientists."

\$28,986 to Dr. Hussni Mohammed for "Investigation of the Role of Oxidative Stress on the Etiology of Equine Motor Neuron Disease."

\$59,493 to Dr. Alan Nixon for "The Impact of Growth Factor Gene Expression Patterns on Repair of Equine Articular Defects."

\$16,880 to Dr. Beth Valentine for "Equine Polysaccharide Storage Myopathy: Biochemical Studies and Effect of a High-Fat Diet."

\$25,000 to Dr. Maurice White for "An Administrative Proposal for Funds to Support the Acquisition of a High-Speed Treadmill."

Total Zweig Funds Awarded—\$290,918

Horse Genome Project *continued from page 3*

The equine gene map also would help researchers determine the genetic basis of inherited conditions such as heaves (chronic obstructive pulmonary disease), "sweet itch" (culicoides hypersensitivity), or "wobbles" (defect in cervical vertebral formation), and assist veterinary clinicians in the diagnosis and management of genetically-determined diseases. Finally, the map would facilitate studies of the evolution of the horse family, which has provided the most complete fossil record of any animal group.

Fertility and performance (including soundness) are two other areas where an equine gene map could have very positive effects on the horse industry. Both fertility and performance are determined by multiple genes acting together. Such multi-gene traits can be dissected and identified with the aid of a gene map.

Small improvements in fertility or soundness could have large effects on breeding farms or training stables. The costs of carrying barren mares through the year is very high, as is the price of lameness in young race horses. It may well be possible to select for improved fertility in both stallions and mares, and at the same time improve the conformation of horses that would result in greater durability. Imagine a horse world with even a 10 percent higher rate of mares in foal, of yearlings going to the sales, of horses completing their two-year old racing seasons sound, or of three-day event horses still competing at age 12. Genetic components affecting all these traits exist. They need only to be identified and used properly.

"A genetic map of the horse does not mean that horse breeding will enter a brave new world, but it will be an

invaluable tool to equine scientists, clinicians, and horse breeders in studying normal growth and development, in diagnosing and managing genetically determined diseases, and in developing new breeding strategies," says Antczak. "I am very pleased that Cornell is so involved in this international and pioneering effort."

While the current efforts at Cornell and elsewhere are focused on methodology, it is expected that applications of the horse gene map will begin soon. The Horse Genome Project is already seeking samples from horse families that carry traits of interest. If you know of such families, or if you have any questions concerning gene mapping in the horse, feel free to call Dr. Doug Antczak at the Baker Institute (607) 256-5600. ■

◀ molasses. These carbohydrates are typically converted into glycogen that is stored within the skeletal muscle. With exercise, the glycogen is rapidly converted to glucose which is used for energy. Dr. Reynolds will analyze total glycogen content in muscle samples from affected horses, both before and after the diet trial, to assess the effect of the high-fat diet on muscle glycogen.

Although horses who suffered from rhabdomyolysis have previously been treated with a diet of reduced carbo-

hydrates, they have never before been systematically given such large portions of fats. By minimizing carbohydrate intake, however, and providing from 20 to 25 percent of total dietary calories from dietary fat in the form of vegetable oil, the researchers believe the fats will be readily used for muscle energy and less glycogen will be stored within the affected muscles. Preliminary evidence suggests that after about two to three months on the diet, affected horses can regain lost muscle mass and nor-

mal gait. They then can successfully resume exercise, performing as pleasure horses or as race horses with minimal to no evidence of exercise-induced muscle injury.

Ultimately, the researchers hope they will someday be able to define the specific defect in affected breeds before the animals work and tie up, thereby preventing muscle damage. They also hope to identify carriers of the disease to provide that information to breeding programs. ■

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The Harry M. Zweig Memorial Fund for Equine Research honors the late Dr. Harry M. Zweig, a distinguished veterinarian, and his numerous contributions to the state's equine industry. In 1979, by amendment to the parimutuel revenue laws, the New York State legislature created the Harry M. Zweig Memorial Fund to promote equine research at the College of Veterinary Medicine, Cornell University. The Harry M. Zweig Committee is established for the purpose of administering the fund and is composed of individuals in specified state agencies and equine industry positions and others who represent equine breeders, owners, trainers, and veterinarians.

1996 Harry M. Zweig Memorial Fund Committee

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