

# Zweig

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

Memorial Fund News Capsule

No. 27 August 1999

FRANK DIMEO



*For two decades, the Zweig Fund has made possible research to improve the health, welfare, and performance of racehorses.*

## INSIDE

- ▶ Zweig Fund Celebrates Its Twentieth Year
- ▶ Committee Member Profile—Anna Zweig

## Zweig Fund Celebrates Its Twentieth Year

**F**or years, Harry M. Zweig played a pivotal role in improving standardbred breeding in New York State and in reviving the Syracuse Fairgrounds as a racing center. When Dr. Zweig died unexpectedly in 1977, the New York State legislature established the Harry M. Zweig Memorial Fund for Equine Research to recognize his efforts. The law mandates that 2 percent of the money generated from betting in the Empire State's horse racing industry be set aside for equine research at Cornell University's New York State College of Veterinary Medicine. The fund's mission: to conduct a balance of basic and practical research that has the potential to improve the health, welfare, and performance of racehorses.



## Twentieth Year *continued from page 1*

In 1979, its first year, \$220,000 was allocated for research on equine leukocyte (white blood cells) antigens, pneumonia, and enteritis in neonates and very young horses; respiratory illnesses at a specific track; the links between a growth rate and performance in thoroughbreds; an improved equine influenza vaccine; selenium and vitamin E deficiency problems in horses; and equine reproduction.

Now, 20 years, more than 200 research projects, and \$7 million later, the Zweig Fund celebrates its twentieth anniversary with a long list of significant accomplishments.

"Zweig-funded research has generated considerable productivity in every domain of the major equine research fields," says Robert Gilbert BVSc, MMedVet, Dipl ACT, associate dean for clinical programs and professional service at Cornell.

"Zweig projects not only have contributed in significant ways to scientific progress but also have directly influenced practice in veterinary medicine and equine husbandry," he adds. "Moreover, Zweig research has triggered whole new lines of research activity funded under other sponsorships."

Here are just a few highlights.

### Cardiopulmonary Research

Work on cardiopulmonary function has focused on better understanding how respiration limits athletic performance in horses—from evaluating diaphragm function and fatigue and the causes, effects, and treatment of lung edema (water in the lungs) to better understanding the causes of exercise-induced pulmonary hemorrhage (bleeding) and the basic mechanics of respiration.

Drs. Richard Hackett DVM, MS, Dipl ACVS, and Norm Ducharme DVM, MSc, Dipl ACVS, for example, have used Zweig funds over the past decade to look at the function of the larynx and palate during exercise to



*Richard Hackett, center, assisted here by Vincent Soderholm and Lisa Thorson, has designed special equipment to better understand the role of respiration in athletic performance and disease.*

**"Zweig projects not only have contributed in significant ways to scientific progress but also have directly influenced practice in veterinary medicine and equine husbandry."**

*Dr. Robert Gilbert*

better understand diseases such as intermittent soft palate displacement and laryngeal hemiplegia (roaring), as well as other aspects of respiratory flow mechanisms. Using a face mask with an ultrasonic flowmeter in conjunction with the indoor treadmill, the researchers can take precise respiratory flow measurements during inspiration and expiration while horses are at rest and galloping high speed.

Hackett and Ducharme have developed a grading system for laryngeal function that is used to assess yearlings before sale, as well as to predict

whether the horses are at risk of roaring once they begin strenuous work. It is also used by veterinarians to screen horses before laryngeal surgery, thereby often avoiding unnecessary "tie-back" surgery because of abnormalities that were evident at rest but were then shown to be insignificant during exercise. The system is now commonly used throughout the country.

### Reproduction

Just as in humans, conception and pregnancy in horses are intricate and complicated processes. For years, equine reproductive specialists have pondered why some mares have difficulty getting pregnant or lose their fetuses and why some stallions are more fertile than others.

Zweig funding has been used for a host of studies related to reproduction, including projects on evaluating potential fertility of breeding stallions; the role of hormones in a mare's fertility cycle, in conception, and in early pregnancy; gamete (egg and sperm) physiology; changes that sperm undergo upon entering the female; factors contributing to foal loss; and embryonic development.

As a result, Cornell's equine repro-

ductive specialists now have an enhanced understanding, for example, of how sperm survive in the mare's reproductive tract. Dr. Barry Ball DVM, PhD, determined how sperm first undergo critical changes after entering a female's oviduct and the vital role that calcium plays as a trigger for changing sperm as it prepares for fertilization. This knowledge has led to more rational management of breeding stallions, to the use of frozen or chilled semen, and to methods of artificial insemination with extremely low numbers of sperm.

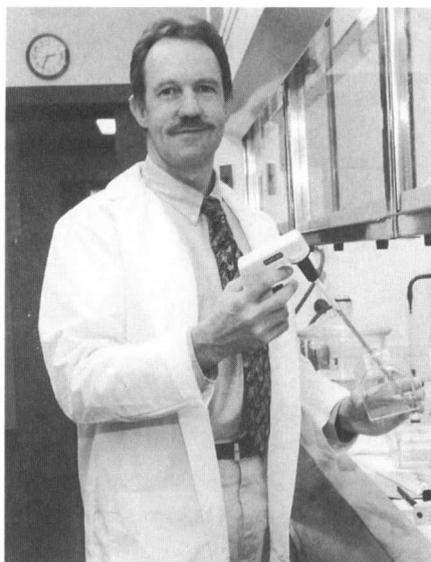
Using a model he developed, Dr. Ball also uncovered how an embryo triggers essential biochemical signals and structural changes that allow the mare to recognize the pregnancy and produce hormones and other changes to support it.

## Orthopedics

Like all athletes, racehorses suffer from a host of bone and joint problems. The Zweig Fund, therefore, has supported diverse projects that have looked at muscle morphology and rehabilitation, gait analysis, tests for diagnosing osteoarthritis, surgical



*Barry Ball's studies of sperm behavior during fertilization have resulted in more successful breeding practices.*



NICOLA KOUNTOUPES

*Alan Nixon is a pioneer in developing gene therapy approaches to repair damaged cartilage.*

procedures to repair bowed tendons, and ways to repair cartilage defects and prevent arthritis.

For almost a decade, for example, Dr. Alan Nixon BVSc, MS, Dipl ACVS, an equine orthopedist, has systematically worked out procedures to restore healthy cartilage that has been damaged by knee and fetlock chips, infection, osteochondritis dissecans disease (OCD), or overuse. Specifically, he has developed methods to harvest immature cartilage cells (chondrocytes) from foals, culture them, stimulate them, and construct an implant that can resurface damaged joints and promote cartilage growth.

The implants have been so successful that they are now used on a regular basis to repair cartilage disease in the stifle, shoulder, fetlock, and knee of the horse. These techniques are now also being used in knee injuries in people, partly as a result of these Zweig studies, Nixon says.

More recently, Nixon's group has been applying gene therapy techniques to repair cartilage damage. He has been working on using modified viruses that carry useful genes such as growth factors. These growth factors can permanently change the cells they enter, stimulating the cells to

produce proteins required for the production of cartilage and joint-lining functions. Nixon is the first to use cartilage-enhancing agents in treating equine arthritis through gene therapy approaches.

The next step, he believes, will be to apply gene therapy to cartilage cells before grafting so they can better synthesize cartilage once inside a joint. Such a technique not only will improve cartilage healing in acute injury, but for the first time could reverse early damage indicative of arthritis in horses and other animals.

## Infectious and Genetic Disease

Numerous diseases continue to plague horses, cutting their racing careers short and causing their owners serious economic losses. Zweig-funded research has supported work on developing or improving vaccines for equine influenza, strangles, and Lyme disease. Other projects sought to understand the causes and/or treatments for equine protozoal myeloencephalitis, equine degenerative myeloencephalitis, equine arteritis virus, Potomac Horse Fever, Equine Motor Neuron Disease, and Equine rhabdomyolysis—commonly known as tying up or Monday Morning Disease.

Dorothy Holmes DVM, PhD, for example, was funded for almost ten years during which time she successfully developed an equine influenza vaccine that was superior to those that were commercially available. Instead of being delivered by injection, Holmes' vaccine can be sprayed into a horse's nose. And it provides protection against the flu for at least ten months, much longer than other vaccines.

Holmes successfully developed two vaccines because horses are susceptible to two types of influenza viruses. Another outstanding advantage to Holmes' vaccines is that they cause



## Twentieth Year *continued from page 3*



*Dorothy Holmes, left, developed influenza vaccines that can be sprayed directly into a horse's nose. Here she and Cindy Lamb swab a horse's pharynx for virus samples.*

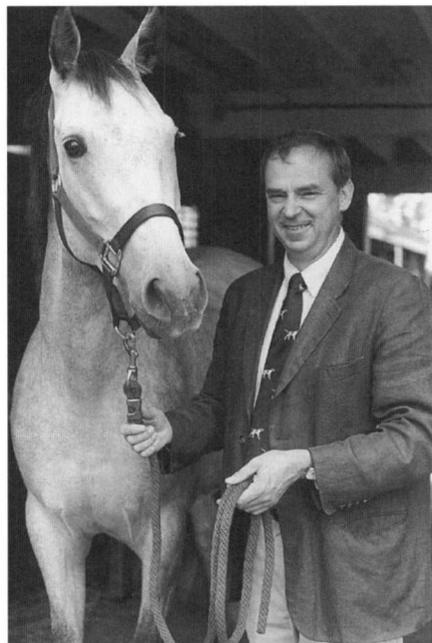
no side effects. The older, injected vaccines often caused swelling, muscle soreness, appetite loss, and dullness. And since owners were encouraged to vaccinate their horses a week before a competition or other large gatherings of horses, many owners wouldn't use the vaccine for fear that their horse would be temporarily compromised. Unlike other vaccines, Holmes' vaccine is also temperature-sensitive, growing only in the cooler upper respiratory tracts, and therefore incapable of producing illness in the lungs.

### Basic Research

Without basic research from which to build higher levels of knowledge, vaccines, implants, and higher pregnancy rates would not be possible. Recognizing the importance of basic research, the Zweig fund has supported a wide range of projects, including immunogenetic studies of the horse; investigations of basic nutritional questions regarding calcium, vitamin E, and the effects of carbohy-

drate diets; and efforts to better understand the gene map of horses.

Douglas Antczak VMD, PhD, director of the James A. Baker Institute for



*Douglas Antczak oversees the development of linkage maps, Cornell's contribution to the international effort to map the horse genome.*

Animal Health, has used Zweig funds over the years to support Cornell's contribution to the mapping of genes in horses.

Although mapping the human genome is far ahead of comparable efforts in horses, the patterns of gene order on human chromosomes tend to be wonderfully close to those of the horse.

"That means that much of the progress that has been made in mapping human genes can be—and is being—applied to horses, allowing researchers to forge ahead at an unprecedented rate," Antczak explains.

Cornell's role in this international undertaking, supported in large part by Zweig Fund monies, is to contribute to the development of a linkage map for the horse. The linkage map pinpoints particular regions on a chromosome that carry genes for specific traits, such as running speed or susceptibility to disease.

Although the Horse Genome Project was launched just a few years ago, researchers already have developed genetic tests to identify severe combined immunodeficiency disease (SCID), hyperkalemic periodic paralysis (HYPP), and lethal white disease so breeders can prevent potentially troublesome stallion-mare pairings. Soon, scientists hope to be able to determine the genetic contributions to conditions such as heaves (chronic obstructive pulmonary disease) or wobblers (a defect in cervical vertebral formation); influence breeding programs; and aid in diagnosing, treating, and preventing a spectrum of genetically based diseases. ■

**B**efore Anna Zweig met her husband, she viewed horses primarily as work animals. Tractors were still uncommon, so horses provided most of the power on her parents' dairy farm in the small town of Nassau in Rensselaer County, about 15 miles southeast of Albany.

After receiving her BS degree in agricultural economics from Cornell University's College of Agriculture in 1952, the future Mrs. Zweig returned home. Although she had taken a job with the phone company, the sudden death of her father turned her attention back to the daily routine of dairy farming. Helping her mother and brother keep the farm operating brought Anna into contact with the local veterinarian, Dr. Harry Zweig.

"He was a professional in his thirties, he was good looking and charming," Mrs. Zweig says. "He was most famous, or rather I should say infamous, for how fast he drove his car over the back roads."

Despite his high-speed driving, she accepted when he asked her out. Their first date? The Saratoga Raceway.

"I knew nothing about racehorses, although the Saratoga track was a popular pastime," she recalls. "Needless to say, I was most impressed."

She learned that Zweig's passion for harness racing had been fanned by a casual dinner about a decade earlier with actor James Cagney's horse trainer Aubrey Rodney. The trainer had lamented that Cagney felt shipping racehorses was becoming too expensive so the actor intended to sell one of his young trotters, Gypsy Hanover. Zweig couldn't resist the terms and bought the horse.

Anna couldn't resist either. She and Harry Zweig soon married. At the time they joined forces, the Nassau Veterinary Clinic was a two-DVM practice that served small and large animal owners and provided boarding facilities. The age of answering machines, beepers, and cell phones had not yet arrived so the family shared the work, making sure information was received and



CHARLES HARRINGTON

*A young Harry Zweig, known for his love of high-speed driving, courted Anna at the Saratoga Raceway.*

forwarded. Everyone assisted wherever and whenever they could.

The Zweig family grew and Mrs. Zweig was busy with their three sons and three daughters.

"That meant involvement with school programs, PTA, library funding, music lessons, sports, and ride sharing, not to mention local political and neighborhood affairs," she recalls of those hectic days.

Within a few years, Harry Zweig's interests in standardbred horses widened. He became increasingly involved with statewide efforts to improve the health and welfare of harness racing in New York. His influence was instrumental in getting the Laverne Law passed, which allows the New York Sires Stakes Program to provide incentives for standardbred breeding in the state.

"And a very personal endeavor of Harry's was to work for the return of harness racing to the New York State Fairgrounds in Syracuse," Mrs. Zweig adds.

Subsequently, the Zweigs established Middlebrook Farms and the family became involved in breeding and raising pacers and trotters, and selling their yearlings at auctions.

"All of us shared feeding, grooming, and maintenance. Everyone learned the joys of success and the disappointments of poor performance," Mrs. Zweig recalls. "An immeasurable benefit was the common bond created among everyone in the family. Now, we often have a good laugh about a near disaster long ago."

The untimely death of Harry Zweig in April 1977 triggered many changes. For some years, Middlebrook Farms continued to operate. Mrs. Zweig participated in all phases of the harness business. She became active in the Harness Horse Breeders of New York State, eventually becoming a director.

As a tribute to Dr. Zweig's efforts, the New York State Legislature, guided by longtime friend Jack Hardy, established the Harry M. Zweig Memorial Fund for Equine Research in his name. The fund is administered by a committee primarily comprised of breeders, trainers, owners, veterinarians, and state officials working in the horse industry. Mrs. Zweig is pleased to be included in this group.

"I believe that the research supported by the Zweig Fund has proven to be a valuable boost to improving the health and performance of all horses," she says. "Harry would be pleased to be remembered with this foresighted effort to enhance the lives of horse and owner."

Today, Anna Zweig still lives on Middlebrook Farm where she boards horses with the help of an employee and her daughter Susan. Susan also keeps the family informed about winning bloodlines. Mrs. Zweig's son Brian is now the only horse owner in the family.

"These days, I have more time for traveling, gardening, reading, and family ventures," Mrs. Zweig says. "I credit my good fortune and good health to my lifelong connection with farming." ■

**Zweig News Capsule**  
**College of Veterinary Medicine**  
**Cornell University**  
**S3020 Schurman Hall**  
**Ithaca, NY 14853-6401**

Permission is granted to reproduce material appearing in this publication, provided that full acknowledgment is made of the source and no change is made without approval, by notifying the editor at 1150 Comstock Hall, Cornell University, Ithaca, NY 14853-0901.

The Zweig News Capsule is produced periodically throughout the year to report on research at the College of Veterinary Medicine, Cornell University, funded by the Harry M. Zweig Memorial Fund for Equine Research.

Writer: Susan S. Lang  
 Editor: Metta Winter  
 Designer: Lorraine Heasley  
 Photography: Dede Hatch and Cornell University  
 Photography

7/99 SV 3.7M MTS80399

Printed on recycled paper

Cornell University is an equal opportunity, affirmative action educator and employer.

Produced by Media and Technology Services at Cornell University

**CORNELL**  
 U N I V E R S I T Y

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.

**1999 Harry M. Zweig Memorial Fund Committee**

Jean Brown  
*Blue Chip Farms, Inc., Wallkill, NY*

Bruce Hamilton  
*Executive Secretary, Harness Horse Breeders of New York State Albany, NY*

John L. Hardy  
*Featherstone, Haut, Conway, Wiley & Cline, LLP, Albany, NY*

Mike Hoblock  
*Chairman, NYS Racing and Wagering Board, Albany, NY*

John E. Jagar, DVM  
*Millbrook, NY*

Douglas Koch, DVM  
*NYS Thoroughbred Breeding & Development Fund Corp., Bedford Hills, NY*

Charles Knauss  
*Executive Director, Agriculture and NYS Horse Breeding Development Fund, Albany, NY*

Paul C. Mountan, DVM  
*Rhinebeck, NY*

Donald F. Smith, DVM, Dipl ACVS  
*Dean, NYS College of Veterinary Medicine at Cornell University Ithaca, NY*

Harry D. Snyder  
*Saratoga Springs, NY*

Patricia Wehle  
*Wehle Stock Farm, Scottsville, NY*

William Wilmot, DVM  
*Saratoga Springs, NY*

Anna Zweig  
*Middlebrook Farm, Nassau, NY*