

Zweig

A report on equine research at the College of Veterinary Medicine at Cornell sponsored by the Harry M. Zweig Memorial Fund

Memorial Fund News Capsule

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DAVID LYNCH-BENJAMIN

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Unknown Virus Under Study for Possible Link to Race Track Illnesses

Just as the racing season was going into full swing last July, more than 200 horses at three New England race tracks fell ill with low-grade fevers, loss of appetite, and swollen legs. Fearing an epidemic of equine viral arteritis (EVA), officials swiftly ordered quarantines and embargoes of horses throughout the Northeast and even abroad for about two months. ▶



DAVID LYNCH-BENJAMIN

Amy Glaser, D.V.M., who discovered the mysterious infection pattern in blood samples taken from ill race horses in New England, takes a blood sample from a horse at the Veterinary College.

“Even if we can’t link GDV to the ‘New England Equine Mystery Disease,’ there are other infectious disease problems of horses for which we have not found the cause. Viruses are rarely, if ever, harmless.”

About ten percent of the ill horses developed a symptom that is rare with EVA: laminitis, or “founder.” In this condition, the sensitive laminae portions of a horse’s feet become inflamed and separate from the hornlike hoof, changing the orientation of the foot bones and ruining the horse’s racing career. Almost three dozen thoroughbreds had to be destroyed because of laminitis.

As the only laboratory in the Northeast offering a comprehensive diagnostic virology service, the Diagnostic Laboratory in Cornell’s College of Veterinary Medicine quickly became involved, testing dozens of blood samples from the ill animals. Experts from Cornell and elsewhere also looked for signs of African horse sickness, equine herpes virus, Lyme disease, Potomac horse fever, equine infectious anemia virus, an influenza strain from Alaska, equine rhinovirus, or some toxin in the horses’ water or feed.

“By the end of July, it was clear that all of our diagnostic efforts had failed to identify the source of the problem,” reports Dr. Edward J. Dubovi, the di-

rector of virology at the Diagnostic Laboratory. But while examining cell cultures from one blood sample, one of Dubovi’s graduate students, Amy Glaser, D.V.M., noticed an infection pattern that she and Dubovi could not identify.

To see if other horses carried this mysterious agent, Dubovi and his technicians went back to the blood samples they had been testing. Sure enough, Dubovi found evidence that about thirty percent of the horses tested from the New England race tracks had antibodies to the mysterious agent—dubbed GDV (“G” for Glaser and “D” for Dubovi)—which meant that the horses had been exposed to the virus at some point. But seventy percent of the sick horses did not carry the antibody, perhaps because they were ill from other causes, their antibodies had not yet developed or couldn’t be detected, or GDV is not related to the outbreak.

But in five horses that showed the clinical symptoms, the researchers found that antibodies had developed after the first blood samples, indicating that the horses had undergone acute

infection between the two samplings.

Although Dubovi and Glaser have not been able to find GDV with an electron microscope or characterize the agent using standard methods, Dubovi believes that the isolate is a variant of the virus to which the horses have developed antibodies.

Evidently, either the quarantines and embargoes stopped the disease in its tracks or the disease took its natural course, because reports of the illness died down by early fall. But Dubovi and his colleagues are not giving up. With a research award from the Zweig Memorial Fund, Dubovi hopes to determine the significance of GDV to equine health.

"Even if we can't link GDV to the 'New England Equine Mystery Disease,' there are other infectious disease problems of horses for which we have not found the cause," Dubovi points out. "Although a virus may be difficult to culture, as is GDV, that's no indication that it is of less clinical significance. Viruses are rarely, if ever, harmless."

Dubovi plans to obtain more definitive prevalence data among breeds and ages by testing for evidence of GDV in blood samples that come into the Diagnostic Laboratory and by delving into the 80,000 blood samples, dating back to 1985, frozen at the lab. He also will explore the Diagnostic Laboratory's equine sera collection to see if GDV can be found in previous samples from horses that experienced conditions such as spontaneous abortion and foal pneumonia and diarrhea to explore whether the isolate may be linked to specific health problems.

"To improve methods for diagnosing GDV in an acute infection, we also plan to infect several colostrum-deprived foals—foals that have had no exposure to antibodies—to find out whether the material we have is, indeed, infectious to the animal. This will provide more information on how long it takes for the animal to develop antibodies and allow us to make a diagnostic reagent for testing." ■

Harry M. Zweig Memorial Fund— 1993 Research Awards

- \$40,000 to Dr. Dorothy M. Ainsworth for "Equine Respiratory Muscle Activity and Its Role in Performance Limitation: Phase II"
- \$6,000 to Dr. Dorothy M. Ainsworth for "Evaluation of Lower Respiratory Tract Disease in Performance Horses"
- \$42,000 to Dr. Douglas F. Antczak for "Immunogenetic Studies of the Horse"
- \$61,000 to Dr. Barry A. Ball for "Gamete Physiology, Fertilization, and Embryonic Development in the Horse"
- \$34,000 to Dr. John E. A. Bertram and Dr. John W. Hermanson for "Desmotomy of the Accessory Ligament of the Superficial Digital Flexor Muscle: An Integrated Approach to Functional Muscle Adaptation with Implications for Rehabilitation"
- \$55,000 to Dr. Peter F. Daels for "Immunization Against Inhibin: A Method for Induction of Multiple Ovulations in the Mare"
- \$5,000 to Dr. Thomas J. Divers for "Use of Ascorbic Acid (Vitamin C) and Acetic Acid (vinegar) as a Urinary Acidifying Agent in the Adult Horse"
- \$19,800 to Dr. Edward J. Dubovi for "A New Infectious Agent in the Equine: Preliminary Studies"
- \$56,000 to Dr. Robin D. Gleed and Dr. Alan Dobson for "Effect of Lasix,® on Capillary Pressure and Water in the Lungs of Exercising Horses"
- \$35,000 to Dr. Richard P. Hackett and Dr. Normand G. Ducharme for "The Effect of Furosemide on Athletic Performance in Racehorses: Part II"
- \$17,000 to Dr. John W. Hermanson for "Muscle Morphology and Myosin Biochemistry in Equine Muscles: Necessary Transitions in Development"
- \$40,000 to Dr. Ronald R. Minor for "Identification of Bone-Specific Collegen Cross-Links in Equine Urine"
- \$32,000 to Dr. Alan J. Nixon for "Growth Factor Stimulated Chondrocyte-Laden Vehicles for Transplantation Resurfacing of Extensive Cartilage Defects in Horses"

Total Zweig Funds Awarded \$442,800

New Video Depicts Zweig Equine Research at Cornell



From showing horses exercising on a high-speed treadmill to receiving cartilage implants, a new 14-minute color video, "Champion Results," provides a quick overview of Zweig-sponsored equine research at the College of Veterinary Medicine at Cornell.

Moving from the classic horse racing photographs of Eadweard Muybridge to contemporary scenes of horses training and racing, the video explains how the Harry M. Zweig Memorial Fund was established in 1979 by the New York State Legislature with money generated from the state's horse racing industry to promote equine research at Cornell. The goal: to maximize the health, welfare, and performance of the horse and to improve the industry's prosperity.

Equine researchers Drs. Richard Hackett, Norm Ducharme,

and Dan Harkins, for example, show how they use a specially designed face mask on horses to test the mechanics of the upper respiratory system as the horses exercise at different levels on the treadmill. Dr. Dorothy Ainsworth, a veterinary respiratory physiologist, explains how she studies the effects of low oxygen on breathing muscles. Drs. Robin Gleed and Alan Dobson discuss their work measuring water in horses' lungs.

The camera also goes into the operating room, where orthopedist Dr. Alan Nixon repairs damaged joints with a cartilage implant he and colleagues developed in the laboratory.

Improving the breeding potential of horses is also an important goal of Zweig research at Cornell. Equine theriogenologists (scientists who study reproduction) Drs.

Barry Ball and Peter Daels illustrate how they are seeking to better understand the regulatory mechanisms of early pregnancy and the nature of embryo development.

The video is available for \$5 to cover handling and shipping costs. To receive a copy, please fill out the enclosed form and send it, along with a check made out to Cornell University, to Ann Prince Rivkin, c/o H. M. Zweig Committee, C-105 Schurman Hall, College of Veterinary Medicine, Cornell University, Ithaca, NY 14853-6401. ■



Order Form

Champion Results

Zweig Memorial Fund Video

Please send me () copies of *Champion Results*, the video on Zweig-funded equine research at the College of Veterinary Medicine at Cornell University. I have enclosed \$5.00 for each video ordered to cover postage and handling.

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SOL GOLDBERG

Dr. Dorothy Holmes and Dr. Jack Lowe collect a nasal sample for Holmes's research in nasal spray vaccines.

After more than ten years of painstaking work funded by the Zweig Fund, Dorothy Holmes, D.V.M., Ph.D., is satisfied that the equine influenza vaccines she developed are superior to those now commercially available. Not only can they be sprayed into a horse's nose, unlike current vaccines that are injected, they also have been shown to provide protection against the flu for at least ten months, a much longer period than the average for injected vaccines.

"We think that protection would probably continue for at least several more months because the antibody levels in all five ponies tested were still high at ten months," says Holmes.

Holmes developed two vaccines because horses are susceptible to two types of influenza viruses: equine A1 and equine A2. The nasal spray A1 virus vaccine is already patented, and the patent for A2 is being considered. Once both are patented, Holmes is hopeful that a pharmaceutical company will conduct the necessary (and expensive) testing required for licensing.

Current vaccines provide protection for only about three months, and horse owners ideally should boost their horses within a week of a competition or other large gathering where horses will be exposed to each other. But the occasional temporary side effects from these vaccines—local swelling, muscle soreness, appetite loss, and dullness—tend to occur just when horses must be at their best. As a result, many owners fail to use the available vaccines.

Holmes's vaccines, however, have caused no side effects. Because they are live-virus vaccines they can be administered by nasal spray instead of injection. This simulates the natural route of influenza virus infection. They also are temperature-sensitive—growing only in the cooler upper-respiratory tract—and are unable to survive in the lungs. Thus, no illness occurs.

"The local growth of the temperature-sensitive virus stimulates the production of both local respiratory tract antibodies as well as systemic serum antibodies in the same manner that is

seen following natural infection," Holmes explains. "The local antibodies are especially important in preventing subsequent disease."

Effective and long-lasting vaccines potentially could save the horse industry millions of dollars. Although influenza is rarely fatal, complications like pneumonia and secondary bacterial infections can be. Influenza also can leave behind a chronic respiratory infection or permanent lameness due to blood vessel damage in the feet caused by the fever. The industry also loses money to influenza because horses don't perform at their peak when they are sick, either from the flu or the vaccine's side effects. In addition, races are sometimes cancelled if too many horses are ill, says Holmes, who retired in 1991 but still teaches part-time in the bacteriological and immunological laboratories in the College of Veterinary Medicine at Cornell.

Holmes's love of horses began more than fifty years ago on Staten Island, where she grew up. "I always loved

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animals, especially horses, but could never get my parents to get more than a parakeet or goldfish," recalls the fifty-nine-year-old scientist. "But when the veterinarian from the local zoo, Cornell grad Patricia O'Connor, came to school and invited us to a Saturday morning zoology class, I jumped at it. For the next seven or eight years, until I went away to college, I went to that class every week." During summers, she worked on a farm in New Hampshire to improve her chances of getting into veterinary school.

In 1954, after three years in what is now the College of Agriculture and Life Sciences at Cornell, Holmes was admitted to the veterinary college. She married classmate Wallace Holmes the first year, had a baby the second year, and was one of three women in the graduating class of fifty or so in 1958.

The young veterinarians moved to Groton to practice, but six years later, with three more children in tow and not enough business to keep them both busy, Dorothy pursued a doctorate in microbiology that was completed in 1973.

With her four children grown, Holmes teaches part-time and steps in during emergencies at the Groton Veterinary Hospital. She and her husband also raise Morgan horses with the help of Rudolph, the red-nosed Doberman. ■

Zweig News Capsule Reader Surveys Still Available

We are still accepting the News Capsule reader surveys that were sent out last winter. If you misplaced your survey or did not receive one and would like to respond, please call or write the H. M. Zweig Committee, C-105 Schurman Hall, College of Veterinary Medicine, Cornell University, Ithaca, NY 14853-6401. Telephone 607-253-3758

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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 pari-mutuel 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 funds and is composed of individuals in specified state agencies and equine industry positions and others who represent equine breeders, owners, trainers, and veterinarians.

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