



Zweig

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



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Zweig Fund celebrates 40th anniversary

By Lauren Cahoon Roberts

The Harry M. Zweig Memorial Fund for Equine Research celebrated its 40th anniversary Nov. 13 at the Cornell University College of Veterinary Medicine with poster presentations, research talks, and toasts and celebrations among researchers, students and committee members.

Zweig's tangible impact on equine health was on display during presentations from both long-time Zweig-funded equine researchers and the next generation of investigators.

"Since its inception, the Zweig Fund has distributed almost \$17 million to investigators at the College of Veterinary Medicine, and this research support has been really critical to establishing Cornell as a leader in equine research," said Dr. Robert Weiss, associate dean for research and graduate education, in his opening remarks. "You'll see how the Zweig Fund supports important discoveries and some of the practical applications of those discoveries."

Dr. Thomas Divers, the Rudolph J. and Katharine L. Steffen Professor of Veterinary Medicine, introduced and moderated the first set of talks, which covered the practical research advances that Zweig funding has helped. He noted that Zweig has aided fundamental science findings, such as the first complete description of the equine genome, as well as insights into neonatal immunology and equine Lyme disease.

Divers also showcased many direct clinical applications, including the Cornell Collar and standing tie-back surgeries for treating recurrent laryngeal neuropathy;



Dean Lorin Warnick with Anna, Sylke and Brian Zweig



Jerry Bilinski '66, D.V.M. '69 (center), was honored at the anniversary dinner

stem cells for preventing equine arthritis; and vitamin D supplements to prevent equine motor neuron disease. Zweig funding has helped bring about the equine Lyme antibody test used by practitioners all over North America, as well as the new leptospirosis vaccine now heavily used in the thoroughbred industry.

Divers also explained how Zweig funding has saved equine lives. New York racetracks have seen a 48 percent reduction of equine racing fatalities in the past five years thanks in part to Zweig-supported research on leading risk factors. Zweig research has also helped unravel the mystery of Theiler's disease and its association with equine parvovirus. Because of Cornell's Zweig-funded work, the USDA now requires that all horses used as blood product donors must be negative for equine parvovirus. Finally, equine practitioners now commonly administer heparin after abdominal surgery to help prevent adhesions — a discovery funded by Zweig.

Following Divers' overview, Drs. Norm Ducharme and Gillian Perkins gave summaries of their research efforts in upper airway problems and equine herpesvirus, respectively, pointing out how Zweig funding has been instrumental in pushing their advances forward.

After the review of past successes at Cornell, the presentations shifted toward future plans.

Lisa Fortier, Ph.D. '98, the James Law Professor of Large Animal Surgery, introduced the upcoming goals for all of Cornell's equine programs, outlining the plan to build their caseload, develop an equine field service and build a new horse barn.

Newer investigators Heidi Reesink, Ph.D. '16, and Michelle Delco '98, D.V.M. '02, Ph.D. '16, gave overviews of their equine research. Reesink discussed her studies on osteoarthritis and fractures with a focus on ending the epidemic of racehorse breakdowns, while Delco discussed mitochondrial dysfunction's role in early joint injury.

Next, Dr. Gerlinde Van de Walle and Jonathan Cheetham, Ph.D. '08, gave overviews of Zweig-funded work that had garnered federal/sponsored funding; Van de Walle highlighted her work in stem cells and viruses, while Cheetham discussed his research on peripheral nerve injury and recurrent laryngeal nerve disease.

Next, Lauren Schnabel, D.V.M. '04, Ph.D. '13, associate professor at North Carolina State University, gave her keynote talk, discussing her interest in using mesenchymal stem cell and platelet-rich plasma as therapeutics for a wide range of equine issues.

At the close of the presentations, Weiss noted, "I think



Dr. Thomas Divers and Lisa Fortier, Ph.D. '98

it's clear that the Zweig fund has had a transformative impact on equine research and has also fostered the creation of a remarkable community of equine scientists. Thanks to our partnership with Zweig, we are positioned to continue to make great strides in equine health."

Attendees then had the chance to mingle over hors d'oeuvres and examine posters showcasing the latest Zweig-funded research.

Later, Zweig committee members, members of the Zweig family and other guests gathered in the second floor of the atrium for a celebratory dinner. During the dinner, Lorin D. Warnick, D.V.M., Ph.D. '94, the Austin O. Hooey Dean of Veterinary Medicine, presented Anna, Brian and Sylke Zweig with a mounted horseshoe from the Cornell farrier shop as a symbol of appreciation for Harry Zweig's impact on Cornell research. Warnick also publicly recognized Jerry Bilinski '66, D.V.M. '69, a dedicated equine practitioner, who served as the New York State Senate representative to the Cornell University Board of Trustees. Warnick presented Bilinski with a mounted and inscribed brick from Schurman Hall.

As the event wound to a close with scientists, students and equine industry leaders sharing stories and insights, it was clear that the legacy of Harry Zweig has become a powerful engine for discovery and service for horses in New York and beyond. ■



The 2019 Zweig Memorial Fund Committee



One of several lectures during the annual Zweig meeting this fall at the Cornell College of Veterinary Medicine

Cornell scientists uncover unusual genetic diversity in Norse horse

By Lauren Cahoon Roberts

When the Vikings brought a few hardy horses to a remote Arctic island free of pests and pathogens, leaving them alone for a thousand years to breed, evolve and endure natural disasters — the resulting genetic diversity in today's herds was the opposite of what scientists at the Cornell University College of Veterinary Medicine had predicted.

"We found a highly unexpected level of heterozygosity and genetic variation in the Icelandic horse breed," says Dr. Doug Antczak '69, the Dorothy Havemeyer McConville Professor of Equine Medicine in the veterinary college's Baker Institute for Animal Health. "This is not the norm in many other horse breeds."

In a study published in the journal *Genes & Immunity*, researchers in the Antczak lab discovered this remarkable level of genetic diversity in a specific genetic region — that of the major histocompatibility complex (MHC), a set of genes coding for cell-surface proteins that help identify foreign molecules. These genes are ubiquitous in vertebrates and play a key role in adaptive immunity.

Antczak has devoted a good portion of his career to studying MHC. "I was just fascinated by it," he says. "When I began studying this for my Ph.D., very little was understood about it at that time." Fast forward to current day, and much is now understood about MHC — including the full genomic structure and polymorphism of the equine MHC region. As a result, scientists have the ability to test the makeup of an individual horse's MHC genes, including what copies of MHC genes a horse received from its parents. Many horse breeds, such as the Thoroughbred, have relatively little MHC genetic diversity, as a result of over 100 years of intense selective breeding by horse breeders.

The Icelandic horse, meanwhile, could not be more different from the Thoroughbred. This tough, multicolored equine breed evolved on the remote island of its namesake, descended from Viking steeds that arrived in the year 1000, with no further introductions of new horses since that time. The breed has endured several population crashes due to natural disasters, which often causes extreme declines in genetic diversity due to the drop in numbers.

To top it off, Icelandic horses also evolved untouched by most major equine pathogens and biting flies — all



elements that are thought to shape and shift the MHC complex to mount adaptive immune responses to such foreign assaults — and, in theory, drive greater MHC diversity as some animals developed immunity advantages over others.

Given the breed's unique set of evolutionary circumstances, Antczak and his research team, then-undergraduate research fellow Camille Holmes and graduate student Nathaniel Violette, D.V.M. '18, wanted to examine MHC diversity of the Icelandic horse.

To do so, the group obtained samples from the Ithaca-based herd of Icelandic horses belonging to their CVM colleague, Dr. Bettina Wagner, chair of the Department of Population Medicine and Diagnostic Sciences, as well as Icelandic horse biobank samples from University of Iceland colleague Dr. Vilhjálmur Svansson. Each herd comprised related individuals: a stallion, several mares and their offspring. Using blood samples from each of the total 156 horses, the team identified and categorized each horse's MHC genotype.

Their results were surprising; all but one of the horses was heterozygous for MHC, meaning they had

mismatched pairs of the MHC genes. Additionally, their MHC samples yielded 79 unique haplotypes (a set of DNA variations that are inherited together), which is a remarkable level of diversity for one gene group.

"The full extent of MHC haplotype variation in the entire Icelandic horse population is unknown, but conceivably could number in the hundreds," says Antczak. "This was unexpected. It has led us to believe there is a genetic shuffling mechanism in place to drive this diversity."

That mechanism, they pose, involves the exchange of genetic information between chromosomes, forming fresh new combinations — known as 'recombination' in geneticist speak. Antczak and other horse geneticists believe the MHC may be a recombination hot spot in the horse genome, keeping those genes fresh even in the face of diversity-diminishing circumstances such as natural disasters or remote islands.

"This discovery illuminates how integral MHC diversity is to a species' survival," says Antczak. "In the case of Icelandic horses, the animals have evolved a mechanism to ensure that these genes continue to remix and refresh." ■



This and opposite page: Icelandic horses, a breed which has retained remarkable genetic diversity despite enduring several population crashes due to natural disasters.

Dr. Elaine Claffey joins Cornell Ruffian Equine Specialists team

By Olivia Hall

Elaine Claffey is the newest member of the Cornell Ruffian Equine Specialist (CRES) team. Recently certified as a Diplomate of the American College of Veterinary Surgeons (Large Animal), the graduate of the Virginia-Maryland College of Veterinary Medicine is involved in all aspects of care at the clinic, from elective and emergency surgery to sports and regenerative medicine and lameness work.

"Coming from the equine hospital in Ithaca, I knew I'd be joining a fantastic team of specialists here at CRES," said Claffey, who spent a year interning at the Vermont Large Animal Clinic before completing a residency in large animal surgery and continuing on as a clinical instructor at Cornell. "This clinic has such a unique place in the Long Island community, and I'm excited to be a part of that."

Her close relationship with horses informs how she approaches her work. "It definitely gives me a valuable outlook when working as an equine veterinarian," Claffey said. "It's easy for me to put myself in place of my clients when they are stressed or worried about their horses, because I'm the same way about mine. It also often helps me sort out subtle lamenesses or performance problems because I have that perspective as a rider."

Wrangler, an 11-year-old quarter horse gelding, was one of Claffey's more memorable patients. The show-winning horse had been hiding a painful condition known as "kissing spine," a condition in which the vertebrae touch or grind against each other. Claffey saw Wrangler for

an orthopedic exam to look for any lameness or pain after Wrangler had been bolting and acting up with his owner, Anjanette Nicolazzo. "These cases of behavioral problems or poor performance can be tricky to sort out; fortunately at Cornell we have the strength of multiple different specialty disciplines so we can work together to solve the problem from many different angles," said Claffey.

After ordering X-rays of Wrangler's spine, Claffey discovered that 11 of Wrangler's vertebrae suffered from kissing spine; four were so severe they had fused together. It was one of the worst cases Claffey had ever seen.

Claffey performed the complicated, four-hour surgery with colleagues Dr. Jackie Hill and Dr. Norm Ducharme. Using X-ray guidance, the team cut parts of the vertebrae that were touching to provide more space for comfortable movement. After a yearlong recovery period, Wrangler was back under saddle and performing once again.

Claffey will continue to help patients



Dr. Elaine Claffey

and owners in her new role at CRES. "Dr. Claffey brings enthusiasm, dedication and incredible work ethic to Ruffian," said Dr. Norm Ducharme, chief medical officer at CRES. "She is one of the finest and brightest surgical residents graduating from the Cornell program, and in addition to her competence she has personal qualities that will help support the core value of our clinic: she is kind and compassionate. We are fortunate to have her." ■



Cornell Ruffian Equine Specialists in Elmont, New York

Leroy Coggins inducted into hall of fame

By Patricia Waldron

Leroy Coggins, Ph.D. '62, an internationally-recognized virologist, former researcher at the Baker Institute for Animal Health and inventor of the "Coggins test" for equine infectious anemia (EIA), was recently inducted into the Harness Racing Museum's Immortal Hall of Fame in Goshen, New York.

Originally from North Carolina, Coggins earned a veterinary degree from Oklahoma State University in 1957 and then completed his Ph.D. at Baker in 1962, back when it was called the Veterinary Virus Research Institute. He studied viruses that cause diarrhea with Baker's founding director and eventual namesake, James Andrew Baker, Ph.D. '38, D.V.M. '40. Later, Coggins returned to Cornell and developed his famous test for EIA, which has been instrumental in controlling this deadly and untreatable disease in horses.

"Dr. Coggins was a soft-spoken gentleman with a southern drawl. He was thoughtful and considerate, and very dedicated to advancing veterinary medicine through research on virus diseases," said Dr. Douglas Antczak '69, the Dorothy Havemeyer McConville Professor of Equine Medicine, who met Coggins shortly after joining the Baker faculty.

The virus that causes EIA spreads through biting flies and an infected horse can expose others for a long time before showing symptoms. There is no vaccine or cure for the disease, making early detection vital to controlling its spread. Approved in 1973, the Coggins test is now required in many states when transporting a horse across state lines or for participation in horse shows and racing.

"The incidence of EIA is so low in the U.S. now that most veterinarians have never seen a case," said Antczak. "The disease is not yet eradicated in the U.S., but may be someday."

In 1980, Coggins returned to his home state as a founding department chair in the newly established North Carolina State University College of Veterinary Medicine program. He passed away in 2014.

A plaque commemorating Coggins' contributions to equine veterinary medicine will be hung at CVM. ■



Leroy Coggins, Ph.D. '62

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