No. 53 June 2012

Zweig

NEWS CAPSULE

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

Ticks untold

Ticks identified as prime suspects causing mystery fevers

Suddenly your horse is sick and you don't know why. She breathes normally but her temperature is rising, her eyes grow yellow with jaundice, she seems depressed, and barely eats. The fever is clear but the cause is not; even the most experienced animal health experts can offer no concrete answers. Eventually the fever fades, but is that the end of whatever caused it, or is the source still lurking somewhere inside?

Horse owners across the states are facing this distressing scenario. At the Cornell University Animal Health Diagnostic Center (AHDC), Dr. Linda Mittel fields a growing number of calls about these mysterious fevers of unknown origins (FUOs). Many come from the Northeast, Mid-Atlantic, and Great Lakes areas: the nation's topmost hotbeds of human tick-borne disease. This pattern led Mittel to suspect that the culprits of the fever caper could be ticks and the difficult-to-diagnose diseases they carry.

"Tick-borne diseases are some of the fastest growing emerging diseases in the United States right now," said Mittel. "As ticks continue expanding their numbers and geographic range these diseases may affect new areas. We get calls about fevers at broodmare operations, showbarns, and farms where race horses rest or layup, even in areas where they didn't know they had ticks. But horses moving between states can move ticks with them, and the effects of this movement are starting to show."

Mittel and colleagues at the AHDC are embarking on a project to find just what diseases ticks in hotbed zones are

carrying and whether they are behind the wash of mystery fevers in horses. The study will use samples from horses suffering FUOs to look for bacterial infections known to be transmitted by ticks (Anaplasma, Babesia, Borrelia, Ehrlichia, and Rickettsia) as well as other bacteria known to cause non-respiratory infection in horses (Leptospira, Bartonella, and Neorickettsia.)

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INSIDE: ICELANDIC HORSES MAY UNLOCK IMMUNOLOGY

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These agents are considered emerging infectious diseases in humans, and this will be the first study determining their presence in horses with FUOs. The study will also sample ticks found on or near horses in designated areas to find which pathogens they carry and to potentially discover previously undocumented tick-borne pathogens.

Many tick-borne diseases are sensitive to specific drugs; others are not sensitive to antibiotics at all. Knowing which diseases are at the root of FUOs will help veterinarians treat them effectively. It will also help owners understand how the causes of fevers might impact affected horses' futures in racing, performance, or showmanship.

"I'm quite excited to start solving the mysteries of these fevers and to possibly uncover new previously unrecognized diseases–in horses and in people," said Mittel. "If these agents are in the horses, humans may also have them without realizing it. People who work with these horses might be particularly at risk. Knowing what we're dealing with here will hopefully solve the mystery of FUOs and help equine and human medicine recognize and address the growing onslaught of tick-borne disease."

This research is funded by the Harry M. Zweig Memorial Fund for Equine Research.

2012 Research Awards

New

$92,885 to Dr. Lisa Fortier for "Identification of the Optimal Biologic to Enhance Endogenous Stem Cell Recruitment and Homing for Facilitated Musculoskeletal Tissue Regeneration"

$54,744 to Dr. Linda Mittel for "Detection of Spirochetes, Rickettsia, and other Bacteria and Parasitic Protozoa (often vector born) that Cause Fevers of Unknown Origin in Horses and in Horse-Associated Ticks in the Northeast, Mid-Atlantic, and Great Lakes Regions"

$62,580 to Dr. Alan Nixon for "Recruiting the Stem Cell Niche for Equine Cartilage Repair"

$133,798 to Dr. Tracy Stokol for "The Role of Platelets in the Pathogenesis of Equid Herpes Virus Type-1 Infection"

$141,021 to Dr. Bettina Wagner for "A Novel Strategy to Boost Antibody Production to EHV-1 in Neonates"

Continuation

$11,736 to Dr. Jonathan Cheetham for "Diagnosis of Poor Performance in Racehorses"

$66,250 to Dr. Dorothy Ainsworth for "The Genetic Basis of Recurrent Laryngeal Neuropathy (RLN) in Thoroughbreds"

$62,733 to Dr. Bettina Wagner for "Innate Immune Mechanisms and T-cell Responses to Equine Herpesvirus Type 1 in Latently Infected and Naïve Horses"

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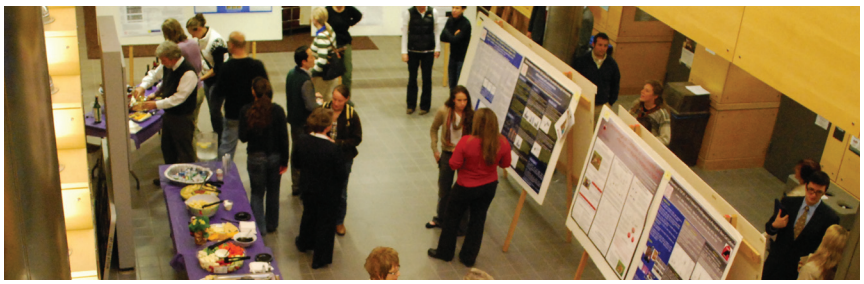
Equine researchers present to Zweig committee

Faculty and graduate students presented many of the College's equine-related research projects through posters and lectures on November 16, 2011. Members of the committee administering the Harry M. Zweig Memorial Fund for Equine Research attended to see the success of currently funded projects and find possible candidates for future support. Committee members and researchers discussed research during a reception after lectures, which included:

- Dr. Thomas Divers: "Spirochete Diseases (Lyme and Leptospirosis) in Horses in the Northeastern United States -- What Have we Learned from our Research and Clinical Experiences?"
- Gillian Perkins: "Prevention of Equine Herpes Virus-1 using RNA Interference and Development of a Reliable Equine Herpes Myeloencephalopathy Animal Model"
- Dr. Bettina Wagner: "Neonatal Cytokine Production and How it May Influence Early-in-Life Vaccination"
- McConville Professor of Equine Medicine Dr. Douglas Antczak: "The Shared Obsession of Equine Herpes Virus"



New collaboration in regenerative medicine

The College of Veterinary Medicine has joined the University of Pittsburgh's McGowan Institute for Regenerative Medicine, a leading center for human medicine innovation, in an exchange of research, techniques, and ideas to advance the science and application of tissue engineering and regenerative medicine in horses, humans, and other animals.

"They're interested in our animal expertise, pre-clinical animal models, and special resources; we're interested in their regenerative expertise and techniques for restoring function to injured or diseased tissue," said Dr. Jon Cheetham, who is now exploring nerve repair techniques in dogs with the hope of applying them to equine and canine medicine.

Cheetham kick-started the collaboration with a daylong meeting in November 2011. Speakers included McGowan scientists, Cornell biological engineering faculty, and College of Veterinary Medicine faculty, including Dean Michael Kotlikoff and Drs. Alex Travis, Julia Felippe, Alan Nixon, and Sofia Cerda-Gonzalez.

Cheetham and other College faculty attended the McGowan Retreat in March 2012, where they shared research and began planning an opportunity for the College's anesthesiology residents to learn new techniques by participating in complex anesthesia cases at McGowan.

Horses to help unlock mysteries of allergies and herpes

For horses, Iceland is a safe haven from disease. Several pathogens never made it to the island, whose native horses evolved for almost 1,000 years in isolation without facing common diseases such as equine herpesvirus type 1 (EHV-1) and insect-induced allergies (called sweet itch or summer eczema).

But immunological ignorance comes at a price: when they leave the country, these internationally popular horses are unusually vulnerable to these diseases. Yet in a mystery that still puzzles immunologists, expatriate Icelandic horses outside Iceland give birth to hardier foals less likely to develop allergies than their parents. Foal and adult immune systems work very differently in all breeds. Learning why could help prevent allergies earlier and enable better vaccines protecting foals from early-developing diseases like EHV-1.

Dr. Bettina Wagner, equine immunologist at the College of Veterinary Medicine, is working to unravel the mystery of neonatal immune development with the help of Icelandic horses. In February 2012, 15 pregnant mares traveled from their native Iceland to Cornell University under meticulous protection from exposure to several common pathogens.

Comparing samples from the mares' first brood born in Iceland in Summer 2011 to their forthcoming siblings born in the U.S., Wagner hopes to reveal how separate factors (environmental and maternal) affect immune development.

"We want to know why foals born outside Iceland have better protection than those born in Iceland," said Wagner. "It could be due to time of exposure, environment, or some combination of these, but the evidence points more to what the mother passes on."

Wagner thinks that protective power may lie in a mare's milk. Some mammals, including humans, start absorbing antibodies while in the uterus, but horses receive all immunities after birth. To absorb immune protection, newborn foals must quickly drink colostrum, mare's milk packed with immune components.

Mares may become hypersensitive to antibodies their bodies make in response to new allergens, but when these anti-

bodies pass on through milk, the foals' budding immune systems may learn to use them more constructively.

Wagner's group investigates specific antibodies that can go astray in allergic diseases, reacting to harmless stimuli and causing inflammation. Building our understanding of early immune development in horses and humans could help doctors treat allergies and early-striking diseases in both species.

"If we know how allergic diseases start early in life we can interfere before they develop," said Wagner. "Horses are a valuable model for human allergies. Regulatory mechanisms develop very early in humans. It's difficult to investigate human neonatal immunity because most maternal immune transfer happens before birth. The horse system is more controllable, especially in Icelandic horses, and can reveal the separate effects of maternal transfer and environmental exposure."

The study may improve protection from EHV-1, which often strikes before current vaccines designed for adult immune systems can protect foals.

"If we can learn how immune responses in foals differ from those in adults, we can use specific immune reactions that foals can mount early in life to develop better neonatal vaccines for earlier protection from a wide array of infectious diseases."

This research is funded by the Harry M. Zweig Memorial Fund for Equine Research.

Mike meets Minnie

Cornell University's Hospital for Animals welcomes its newest resident: Minnie the miniature horse. Minnie's stint at the hospital as a patient turned into a career as a companion when her owner generously donated her to the hospital after learning the Hospital was seeking company for Mike, the College's blood-donor draft-horse.

"Mike lives by himself, and horses are herd animals that do better in groups," said Dr. Sally Ness, internal medicine resident.

Good timing is a great matchmaker, and despite the size difference the unlikely pair clicked. Minnie has also become a star attraction at the College's Annual Open House, where she made her first public debut in April 2012 by popular request.

"Twenty kids lined up along the paddock fence asking to 'pet the pony,'" said Ness. "Students spiffed her up with ribbons, and she was a huge hit. Mike loves his new pal and was actually a little concerned when we borrowed her for the festivities. They are fully moved in together and share his stall and paddock. She is definitely the boss: we were worried about Mike stealing her grain, but in fact she will finish and go over and push him away from his breakfast! But he seems to appreciate the company and doesn't seem to mind."

Zweig Memorial Trot 2012

Vernon Downs, Vernon, N.Y.
Sunday, August 26, 2012 – Post Time: 1:15pm

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 fund 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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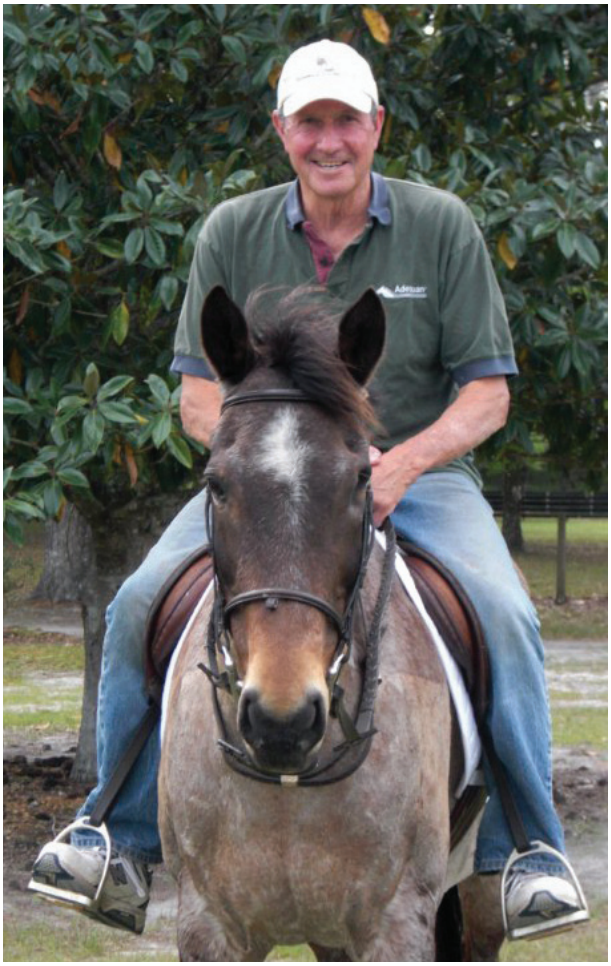
Horses at home

Many members of the Zweig Fund Committee enjoy equine companions at home as well as work. This photo series will run over several issues of the *Zweig News Capsule* featuring images of Committee members with their horses.

Above: Mrs. Anna Zweig walks with her horse, Ted's Girl, at Middlebrook Farms, Nassau, New York, where she cares for harness horses with the help of her colleague, John, and her daughter, Susan.



Above: Dr. Paul C. Mountan after a trail ride with Theresa, a 17-year old retired Argentine polo mare he adopted from her former owner after her eye was injured in a polo game.