

On Call

A MAGAZINE FOR FRIENDS OF THE UNIVERSITY OF WISCONSIN SCHOOL OF VETERINARY MEDICINE

Back on Track

UW Veterinary Care experts, advanced tools get equine patients to top form

Battling Against Outbreaks

How Wisconsin's state veterinarians are safeguarding animal and human health

Signatures of Ebola

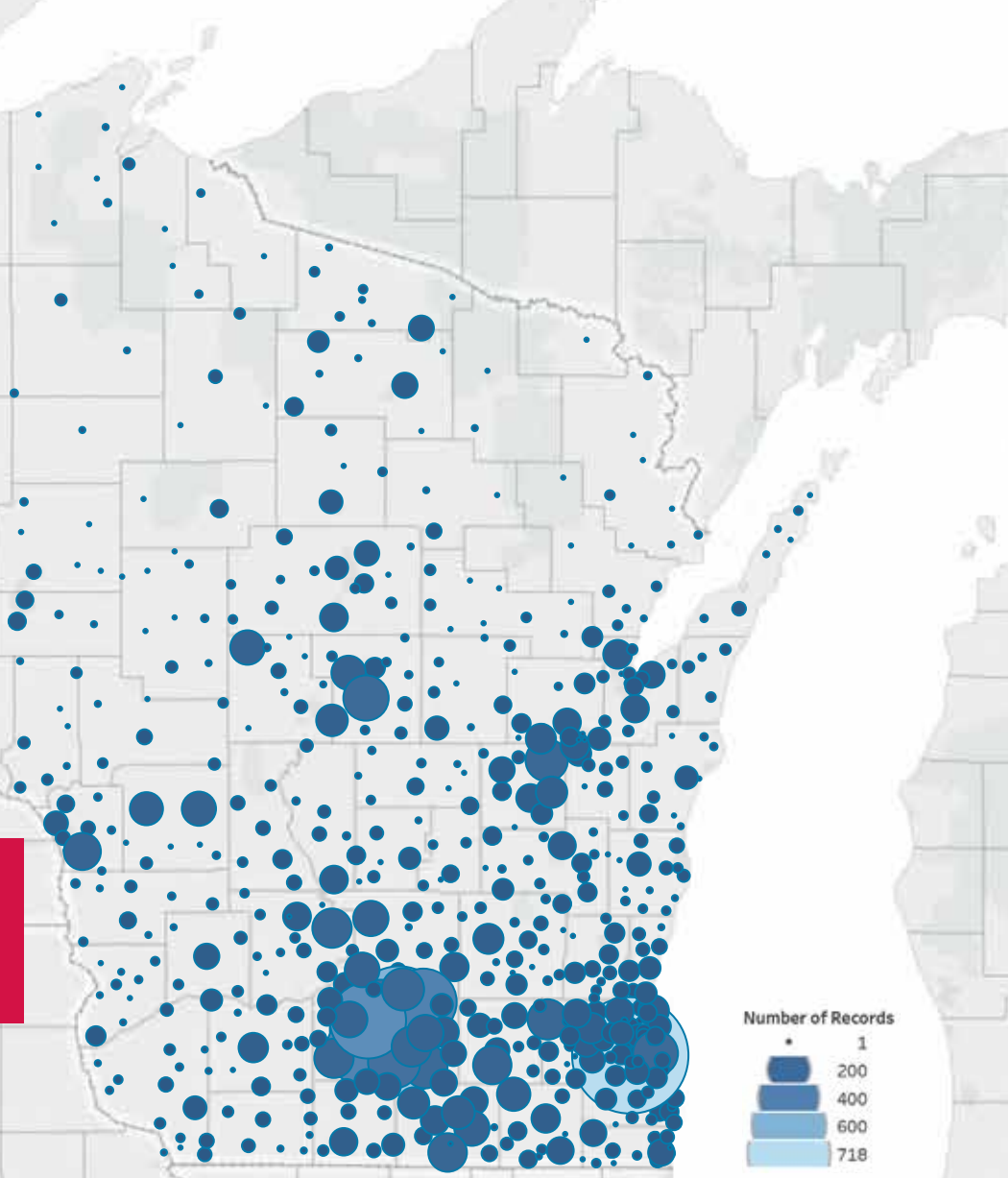
In the heart of devastating outbreak, researchers unlock secrets of disease



School of
Veterinary Medicine

UNIVERSITY OF WISCONSIN-MADISON

OUR IMPACT ON WISCONSIN



The UW School of Veterinary Medicine's reach extends to almost every county in the state.

Learn more about how the UW School of Veterinary Medicine is advancing animal and human health at AnimalsNeedHeroesToo.com

- **Nearly 1,300 of our DVM alumni live in Wisconsin.** They serve the state in private practices and lead the veterinary medical community in high-level positions at organizations such as the Wisconsin Department of Agriculture, Trade, and Consumer Protection, the International Crane Foundation, and the Wisconsin Veterinary Medical Association.
- **In the past year, more than 1,200 participants from across the state completed courses offered through our Office of Continuing Education.**
- **Our teaching hospital, UW Veterinary Care, helped treat the animals of more than 7,400 Wisconsin residents in 2016-17.**
- **Our specialists provided guidance to the state's farmers and veterinarians in areas of expertise ranging from anesthesia to food animal production to zoological medicine.** UW Veterinary Care began with 10 specialties in 1983; today, it has more than 20.

Features



Back on Track

Ranging from dentistry to surgery, farrier service to sports medicine and rehabilitation, the team of board-certified specialists in the Morrie Waud Large Animal Hospital at UW Veterinary Care provide comprehensive care to equine patients, whether it's a routine checkup or a complex diagnosis.

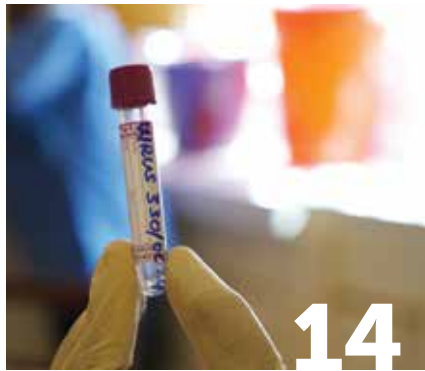
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Battling Back Against Outbreaks

Safeguarding animal health, public health, and Wisconsin industries is all in a day's work for state veterinarians Paul McGraw and Darlene Konkle.

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Signatures of Ebola

In the heart of a devastating outbreak, a scientific team led by the SVM's Yoshihiro Kawaoka unlocks secrets of the Ebola virus that may aid in future treatment efforts.

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Cougar, a 24-year-old Quarter Horse, enjoys a sunny afternoon outside the UW Veterinary Care Morrie Waud Large Animal Hospital following a routine examination. (Photo: Denise Garlow)



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A Busy Year

I hope your 2018 is off to a great start. Welcome to the spring 2018 edition of *On Call*. This issue of the magazine highlights many of the school's strengths – from our outstanding faculty members' recent research findings to advancements in teaching our DVM students to the crucial work our alumni are doing to improve public health throughout Wisconsin and beyond.

In these pages, you can learn more about Ian Duncan's recent study on demyelination and nervous system function, Yoshi Kawaoka's investigations of H7N9 influenza, and Tony Goldberg's findings on the impact of human cold viruses on chimpanzees in Uganda.

You will also find stories illustrating the important role veterinarians play across the state in protecting animal health, human health, and Wisconsin's agricultural industries. You will note that the Wisconsin state veterinarian and assistant state veterinarian, Paul McGraw DVM'88 and Darlene Konkle DVM'93, are both UW School of Veterinary Medicine alumni.

Inside the classroom, we continue to make improvements in how we teach our students about the profession and provide them with the skills they will need to succeed as veterinarians. Some of these new tools include our digital microscopy platform now used in the first-year Veterinary Histology course and the experiences our students gain by performing health checks on the captive flock at the International Crane Foundation.

This year, our advancement team and I will be dedicated to disseminating information regarding the importance and impact of the school's new addition on the citizens throughout the state of Wisconsin. The building's expansion will significantly improve our large animal hospital, increase the footprint of our small animal hospital, and enhance our teaching and research spaces, particularly those focused on infectious disease research. Our goal is to have the architects and engineers for the new Lot 62 parking ramp selected this spring, with the architects and engineers for the building expansion selected soon thereafter. We remain focused on connecting with the Wisconsin Legislature and the Governor's Office so that our project is enumerated in the 2019-21 budget. This enumeration will occur within the next year, as the governor announces his budget in winter 2019 and the Legislature develops its budget in spring 2019. We look forward to working with you to share this message, particularly to the state's legislators and the governor.

I hope you have a prosperous and happy 2018 and, as always, feel free to visit the school when you have an opportunity.



Mark D. Markel

On Call SPRING 2018

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Mark D. Markel, Dean

Ask a UW Veterinarian



On Shaky Ground: Puzzled by Dog's Tremors

This expert response comes from **Sandi Sawchuk**, primary care veterinarian at UW Veterinary Care and SVM clinical instructor, and **Helena Rylander**, clinical associate professor and board-certified specialist in veterinary neurology.

Question: Sometimes my dog's legs shake and tremble. It doesn't seem to bother his attitude or activity, but I've always wondered why he might be doing it. –Mary Jo Koranda, Sun Prairie, Wis.

Answer: Shaking or tremors in dogs can have multiple causes that can generally be ruled in or out by a thorough physical examination by your veterinarian, followed by lab work if indicated.

Cold and fear generally cause whole body tremors that disappear when the dog relaxes in a warm environment. Pain – stemming from the muscles, joints, or nerves, such as with chronic disc disease – can also cause intermittent trembling of a limb, especially in combination with exercise or exertion.

For older patients with some muscle atrophy, perhaps secondary to disuse due to arthritis, just the act of standing for a short period of time may bring on some limb tremors because of muscle fatigue.

Although uncommon, electrolyte abnormalities, calcium imbalance, some infectious diseases, and breed-related conditions of the nervous system can cause tremors, which is why your veterinarian may want to run some lab tests.

Some breeds have age-related tremors of unknown cause, which would be diagnosed if nothing is found to explain the tremors after a thorough examination and tests. This form of tremor is benign.

Testing can also be helpful if pain medications are being considered as a therapeutic treatment.

Questions

Have a question for our veterinary medical experts?

Please send it to the *On Call* editor at oncall@vetmed.wisc.edu. We cannot guarantee responses to all submissions. For any urgent pet health issue, please contact your veterinarian directly.

Socializing with the SVM

Friends of the school sharing their thoughts (and pets) on social media...



"We made it! Apparently they didn't realize a celebrity was coming because they didn't save a parking spot for us. No matter, his highness got carried in. The students are already in love!"

–Sarah Erickson

Via UWVC Facebook (@uwwveterinary care)



"Got my teeth floated and my tear ducts flushed and tortured some vet students! It was a good day!"

–Gypsy Roads Carriage Company Carriage and Pony

Via SVM Facebook (@uwwvetmed)

A Little Myelin Goes a Long Way to Restore Nervous System

In the central nervous system of humans and all other mammals, a vital insulating sheath composed of lipids and proteins around nerve fibers helps speed the electrical signals or nerve impulses that direct our bodies to walk, talk, breathe, swallow, or perform any routine physical act.

But diseases of the nervous system, including multiple sclerosis (MS) in people, degrade this essential insulation known as myelin, disrupting the flow of information between the brain and the body.

And while scientists have long studied myelin and understand its role in disease when it degrades, they have puzzled over how myelin repairs itself naturally and whether the thinned sheaths that are a hallmark of the healing nervous system are adequate for restoring the brain's circuitry over the long haul.

In October, in a study published in

the *Proceedings of the National Academy of Sciences*, a team of researchers from UW–Madison reported that in long-lived animals, renewed but thin myelin sheaths are enough to restore the impaired nervous system and can do so for years after the onset of disease.

The team's findings reinforce the idea that thin myelin sheaths are a valid, persistent marker of remyelination, a hypothesis challenged by other recent research. **Ian Duncan**, an expert on demyelinating diseases at the UW School of Veterinary Medicine, is the senior author of the new study.

Duncan and his team looked at a unique genetic disorder that naturally afflicts Weimaraners, a breed of dog that as 12- to 14-day-old pups can develop a severe tremor and loss of coordination. The condition is known to occur as the development of the myelin sheath in parts of the dog's central nervous system is delayed. The symptoms gradually

diminish and in most cases disappear altogether by 3–4 months of age.

"This is a very widespread mutation in the breed," says Duncan, noting that myelin repair mimicking what is seen in remyelination is known to occur in these dogs as the rejuvenated nerve fibers have a thinned myelin sheath.

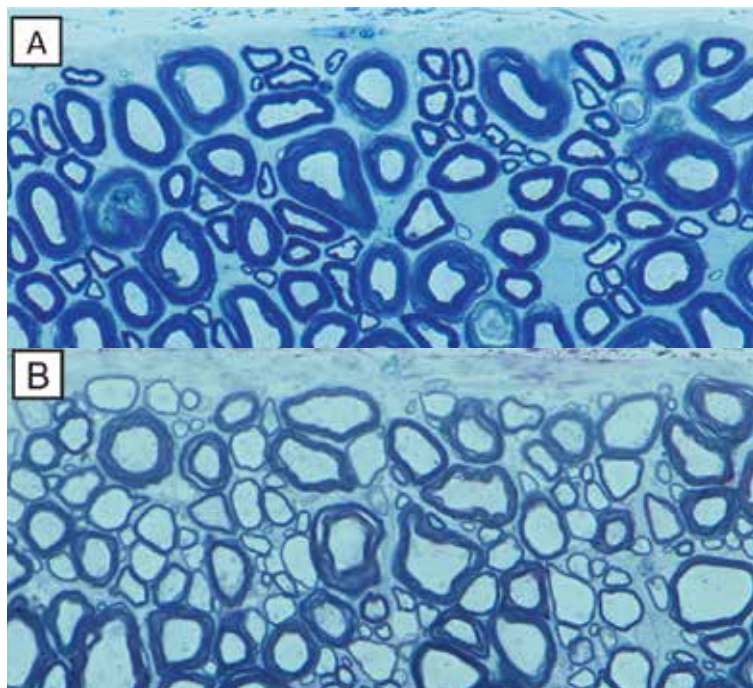
The study was made possible when two Weimaraner pups, littermates, were seen as patients at the School of Veterinary Medicine 13 years ago. Duncan was able to maintain contact with the owners after the dogs were adopted and retrieve samples of spinal tissue after the dogs lived out their lives. As they aged, the dogs exhibited few signs of tremor and were deemed "neurologically normal" up to 13 years of age.

To expand on the results, Duncan also looked at a condition in cats, another long-lived species that has been shown to fully recover nervous system function after demyelination. In particular, Duncan's team was interested in remyelination of the optic nerves.

That element of the study, looking at remyelination two years after the onset of the condition, Duncan notes, is an example of "true demyelination and remyelination. We found that nearly every optic nerve fiber was remyelinated with a thin myelin sheath, which is important for understanding human disease because in multiple sclerosis, the optic nerve is often the first to be demyelinated."

The new findings confirm that the gold standard for evaluating remyelination is the long-term persistence of thin myelin sheaths, which support nerve fiber function and survival, Duncan notes. The results are important for diseases like MS as it means that new therapies designed to promote myelin repair can be safely evaluated and quantified based on the presence of thin myelin sheaths.

Terry Devitt



The normal mature dog spinal cord (A) has many axons surrounded by thick myelin sheaths (blue). In contrast, in the recovered dog with the genetic abnormality (B), there are many axons with thin myelin sheaths, identical to that seen in remyelination.

H7N9 Influenza is Both Lethal and Transmissible in Animal Model for Flu

In 2013, an influenza virus that had never before been detected began circulating among poultry in China. It caused several waves of human infection and in late 2016, the number of people to become sick from the H7N9 virus suddenly started to rise. As of mid-2017, nearly 1,600 people had tested positive for avian H7N9. Nearly 40 percent of those infected had died.

Yoshihiro Kawaoka, a professor of pathobiological sciences at the UW School of Veterinary Medicine, received a sample of H7N9 virus isolated from a patient in China who had died of the flu. He and his research team subsequently began work to characterize and understand it. The first of those results were published in October in *Cell Host & Microbe*.

For the first time, Kawaoka says, his team has identified an influenza virus strain that is both transmissible between ferrets (the best animal model proxy for human influenza infections) and lethal, both in the animal originally infected and in otherwise healthy ferrets in close contact with these infected animals.

“This is the first case of a highly pathogenic avian virus that transmits between ferrets and kills them,” Kawaoka says. “That’s not good for public health.”

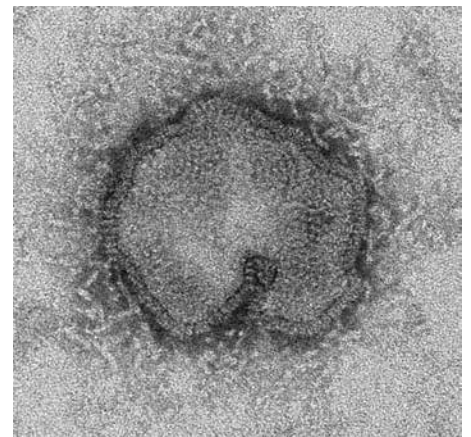
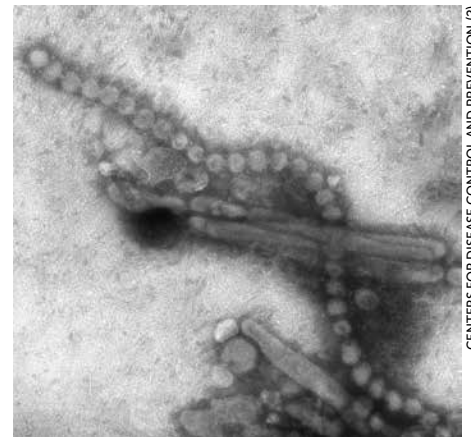
Influenza viruses are well known for their propensity to adapt. With each new infection of a host, small changes take place within the genomes of influenza

viruses. Sometimes these mutations occur in key regions and lead to significant alterations to the original virus, rendering it capable of infecting new hosts, making hosts sick, causing greater illness, and becoming resistant to the drugs typically used to treat them.

Kawaoka and his team observed this within the sample isolated from the deceased patient, who while alive had been treated with the common flu drug Tamiflu. Using a technique to read the genetic identity of the virus population that had infected the patient, Kawaoka’s team learned the virus had started to mutate: The sample contained a population of H7N9 virus that was sensitive to Tamiflu and a population that was resistant.

So the team created two viruses virtually identical to those isolated from the patient, one sensitive to Tamiflu and the other bearing the mutation that conferred resistance to the drug. Comparing this to a low-pathogenic version of the H7N9 virus that Kawaoka and others had previously studied, the research team assessed how well each virus grows in human respiratory cells, where most influenza viruses take up residence in the body. They found that each grew efficiently, though the resistant strain was less effective than the other two.

Kawaoka notes that further alterations to the virus may not be necessary to make it a potential public health



Top: Influenza A H7N9 as viewed through an electron microscope. Both filaments and spheres are observed in this photo.

Bottom: Spherical influenza A H7N9 virus as viewed through an electron microscope.

threat, though human-to-human transmission has thus far remained limited.

To learn more about this research:

go.wisc.edu/H7N9.

Kelly April Tyrrell

Other Recent Research Highlights



Albee Messing, professor emeritus of comparative biosciences, is co-author of a study in *Annals of Neurology* offering promising results in the lab and in animal models that could set the stage for developing a treatment for Alexander disease, a rare and usually fatal

neurological disease with no known cure. “For the first time, we have a reasonable chance to develop an effective treatment,” he says.



Tom Friedrich, associate professor of pathobiological sciences, is part of a team from UW–Madison, Iowa State University, and the University of Iowa working together to develop and test a nanovaccine that could provide a greater level of protection against the flu virus.

The researchers are loading synthesized influenza proteins into nanoparticles that are incorporated into a nasal spray.



Back on Track

UWVC's board-certified specialists in the Morrie Waud Large Animal Hospital provide comprehensive care to equine patients, from routine checkup to complex diagnosis

By Ashley Voss

On a sunny winter day, **Cougar**, a 24-year-old Quarter Horse, gallops around the paddock behind the Morrie Waud Large Animal Hospital at UW Veterinary Care (UWVC), his sorrel coat glistening in the afternoon light as he strides about the familiar pasture.

"Cougar has three speeds: fast, faster, and fastest," says his owner, **Gail Bilmar**.

She first brought Cougar to the teaching hospital in 2012 when he needed specialty care for respiratory issues and was treated by **Sheila**

McGuirk, professor of large animal internal medicine and food animal production medicine. Since then, access to comprehensive, high-level equine care has kept Bilmar regularly returning.

Every five weeks, she loads Cougar and **Beethoven**, a 15-year-old Paint, into their trailer and makes the three-hour journey from Libertyville, Illinois, to UWVC to see **Sabrina Brounts**, clinical associate professor of large animal surgery and sports medicine. "She goes over them from head to toe," Bilmar says. "I'd rather catch things

early and get ahead of any problems."

Although she relies on her local veterinarians for urgent care, Bilmar entrusts Brounts and the full UWVC team with her horses' routine and preventive care, from vaccinations and nutritional support to dentistry and farrier services tailored to their individual needs.

"**Dean (Johanningmeier)**, the farrier, creates special shoes for Cougar and Beethoven," she says. "My boys are moving better than ever – good shoes make all the difference." A



UW Veterinary Care offers several advanced diagnostic tools and techniques such as nuclear scintigraphy (pictured), dynamic endoscopy, and flexible needle arthroscopy.

difference that has Cougar running with the renewed energy of a colt again. “Cougar thinks he’s two, not 24. Why? Because of the university and the good care they give him,” Bilmar quips.

ROUTINE TO COMPLEX CARE

In 2016-17, the Morrie Waud Large Animal Hospital at UW Veterinary Care saw nearly 1,100 equine patient visits spanning its farrier, internal medicine, surgery, and sports medicine services.

While the clinic serves as a primary care provider for patients like Cougar and Beethoven, for others it serves as a last chance and a place where clients turn when their animals need advanced care and diagnostic technologies that aren’t available anywhere else in the region.

Every day, UWVC’s specialists, residents and certified veterinary technicians tackle complex cases in equine patients large and small – from helping a Lusitano with severe laminitis (inflammation of the soft tissue structures that attach the pedal bone of the foot to the hoof wall) avoid euthanasia by providing months of around-the-clock care to repairing the limb deformity of a miniature donkey.

Brounts, the state’s only board-certified equine sports medicine and rehabilitation specialist, has helped a range of equine athletes return to their prime – from Wisconsin farm horses to a national dressage champion to international race horses. For her,

collaboration is key to meeting the needs of each individual animal.

“If you look at human medicine, all the high-performance athletes have a full team behind them developing a plan that’s best for that individual to be successful,” Brounts says. “Many horses are athletes too – the same as an NFL player or NBA player – and it takes a team to keep that horse healthy.”

“We try to identify the best diagnostics and research to tailor a treatment to the horse, one that will benefit it the most to get it back home, back to racing or jumping, back to dressage or eventing.”

CUTTING-EDGE DIAGNOSTICS

UWVC is the first and only veterinary hospital in the Midwest to offer dynamic endoscopy, which allows veterinarians to evaluate airway movement and function while a horse is exercising.

The tool, which uses a tiny camera to view inside the horse’s throat, attaches to the horse’s bridle and saddle pad and transmits readings to a remote tablet. It can be used without interference while a horse is moving or being ridden, which is useful for diagnosing laryngeal hemiplegia, a paralysis of the cartilage in the voice box (larynx) and vocal cords (vocal folds), and other ailments that interfere with a horse’s breathing.

“These conditions cause exercise intolerance or abnormal airway noises that can be limiting to an athletic

horse’s career,” says **Samantha Morello**, clinical assistant professor of large animal surgery. “But the dynamic endoscope gives us a much more accurate diagnosis with which we can better plan treatment.”

The Morrie Waud Large Animal Hospital is also the only facility in the Midwest to offer flexible needle arthroscopy in the standing horse. This is especially useful for evaluating the stifle – basically the equivalent of the human knee and a common location of injuries in athletic horses – with improved accuracy and shortened procedure recovery time.

UWVC clinicians are utilizing a new tool to streamline lameness exams, as well. Gathering measurements from three sensors affixed to the horse – one on top of the head, one on the ankle and one on the pelvis or rear – the Lameness Locator program makes pinpointing the affected limb much easier and calculates an objective numeric score.

“You still have to watch the animal and figure out the cause of the lameness, but it gives you a baseline number for comparison,” says **Amelia Munsterman**, clinical assistant professor of large animal surgery. “It’s a great way to monitor progress. Having a numeric value in the chart to compare to is a key measure – especially in cases where the patient sees a different doctor on a follow-up visit.”

TREATING THE BIG PICTURE

Munsterman, who joined the School of Veterinary Medicine faculty in 2016, is board certified in both surgery and large animal emergency and critical care.

While her primary research focuses on monitoring for complications after surgery and developing methods for measuring abdominal pressure, she is also interested in traditional Chinese veterinary medicine. Munsterman is certified in acupuncture, a therapy she’s found to be an effective addition to conventional diagnostic and treatment plans for equine patients.

“Horses are great because you



Amelia Munsterman, clinical assistant professor of large animal surgery, references a chart of diagnostic acupuncture points used for equine patients.

can actually scan them, by running your finger or a pen cap over their acupuncture points. They actually ‘tell’ you what’s wrong with them,” she says. “With other species like dogs, you can sometimes see it, but horses are the best in terms of their response.”

“If a point is sensitive, they will look at you or move away from you,” she adds. “So then if I set that collection of points, I can bring them together to look at the big picture to say ‘OK, he’s telling me that his hock hurts today.’”

GROUNDBREAKING RESEARCH

When they’re not treating patients, UWVC’s specialists dedicate a significant portion of their time to research in areas including tendon healing, joint therapies, neonatology, and post-operative care. Their findings inform new, advanced treatments delivered in the clinic.

For example, Brounts can now offer patients a novel method for monitoring tendon injuries that is only available at UW–Madison. Her dissertation research uses Acoustoelastography (AEG) – a technique developed in the Department of Biomedical Engineering to monitor human Achilles tendon injuries – to evaluate similar injuries in horses. Using ultrasound technology, she creates dynamic videos that show the stiffness of tendons and help measure with an objective rating how well they have healed.

“Performance horses commonly suffer injuries to their superficial digital

flexor tendons, and they often re-injure them after a premature return to competition,” says Brounts. “AEG provides a simple, objective, non-invasive method for monitoring healing progress and helps take the guesswork out of deciding when a horse can safely return to competition.”

To date, she has followed the tendon injuries of more than 50 horses ranging from 5 to 30 years of age – each for a span of six months to a year – and hopes to further evaluate the average healing rates based on age groups.

GROWING TO MEET FUTURE NEEDS

Given all of this specialized technology, the space available for clinical care, along with education and research space, is reaching a critical limit.

The UW School of Veterinary Medicine is in the middle of a \$115 million building expansion campaign, *Animals Need Heroes Too*, which requires private and public support.

A top priority for UW–Madison’s 2019-21 building window, the project will enhance the Morrie Waud Large Animal Hospital, double the size of the small animal hospital, provide additional learning spaces, and triple the school’s research space.

Planned improvements to the large animal hospital include the addition of a covered arena that provides year-round access to lameness and neurological exams, regardless of the weather, as well as a larger and even safer isolation facility, which will be the only one of its kind in the state.

During the campaign, the hospital continues to make improvements. The large animal hospital’s reception space has recently undergone a transformation to boost staff and client comfort and an equine bay inside the clinic is being reconfigured to create a dedicated space where clinicians and students can review patient cases.

“We’ve creatively repurposed storage spaces and retrofitted rooms to squeeze the most productivity out of our current space,” says **Ruthanne Chun DVM’91**, associate dean for clinical affairs and UWVC director. “Despite these challenges, we’ve delivered high-quality care because of our team’s focus on serving our patients.”

“It’s clear that our patients and clients will benefit greatly from the completion of this expansion, but so will our students, who are the future of the veterinary medical profession, and so will animal lovers, veterinarians, and people across Wisconsin.”

Learn more about the school’s future plans at **AnimalsNeedHeroesToo.com**.

New Faculty Focus



Fernando Marqués, clinical associate professor of large animal internal medicine, is a show jumping rider, currently grouped in the second of eight total categories in Argentina. The first category is for professional riders only, with the eighth being the lowest grouping. Marqués has trained horses for more than 25 years, primarily in the show jumping field, as well as dressage. He has also been a show jumping instructor for more than seven years. go.wisc.edu/marques

BATTLING BACK AGAINST OUTBREAKS



Wisconsin's livestock industries contribute more than \$50 billion annually to the state's economy. Upholding these markets and minimizing the financial consequences of any disease outbreaks are a major focus for the Wisconsin DATCP Division of Animal Health.

By Meghan Lepisto

Safeguarding animal health, public health, and Wisconsin industries is all in a day's work for state veterinarians

Health concerns can keep any of us up at night. But for **Paul McGraw DVM'88** and **Darlene Konkle DVM'93** – the Wisconsin state veterinarian and assistant state veterinarian, respectively – disease and its potential impact is an ever-present worry.

Take, for instance, foot-and-mouth disease, a serious, highly contagious virus affecting cows, pigs, and other cloven-hoofed animals.

“Estimates are that a foot-and-mouth disease outbreak would cost the U.S. economy over \$200 billion in 10 years in lost sales to beef, pork, corn and soybeans,” explains McGraw. “That’s a devastating disease.”

While the virus was eradicated from the United States in the 1920s, it still circulates in two-thirds of the world. Amidst today’s global connectivity and recent U.S. outbreaks of other foreign animal diseases, reentry of foot-and-mouth disease is not out of the question.

“As our world has continued to become more mobile, with agricultural products imported between countries and populations moving, we know that those risks are there,” says McGraw. “That certainly does not help state veterinarians sleep any better.”

It is threats such as these that McGraw, Konkle, and more than 40 office and field staff in the Wisconsin

Department of Agriculture, Trade, and Consumer Protection’s Division of Animal Health work to monitor for and fend off. The office advances a critical mission: to safeguard animal health, public health, and animal industries in Wisconsin utilizing the best available science and public policy. From fish to horses to farm-raised deer, this includes the surveillance of animals for disease and, should a risk emerge, managing its swift containment or eradication.

“We train our staff to be prepared for any diseases that we don’t have in the state. First of all we want to keep those diseases out and second of all we want to manage them quickly if they do arise,” says Konkle.



A recently launched swine health program in Wisconsin is one example of how McGraw, Konkle, and the Division of Animal Health are working with state industry groups to gauge and prepare for emerging disease threats.

Financial Matters

Much is at stake in protecting Wisconsin's livestock, companion animals, and human residents, as well as the state's culture and economy. Agriculture industries alone contribute \$88 billion annually to Wisconsin's economy, with livestock accounting for nearly 60 percent of that total. Upholding the state's agricultural export markets and minimizing the financial consequences of any outbreaks are a major concern for McGraw and Konkle.

"Disease is the one thing that can stop the export market and that's been demonstrated with avian influenza," says McGraw.

In 2015, Wisconsin was one of 16 states that experienced an epidemic of highly pathogenic avian influenza, or bird flu. In total across the country, approximately 50 million poultry, including chickens, turkeys, and pheasants, were infected with the virus. "That was our biggest animal disease response to date in Wisconsin and it was for the country too," says Konkle.

In the wake of the outbreak, foreign

"It's a different type of veterinary medicine obviously, but looking at livestock and companion animal health across the state, and working with all of our agency partners, I can't say I've ever had a boring day."

—Darlene Konkle DVM'93
Wisconsin assistant state veterinarian

nations blocked poultry and poultry products from affected U.S. states and sometimes the whole country. Many of these export bans are still in place today.

"That's a really big deal," says McGraw. "A big part of what we do is try to control that disease to get that market open again."

To prevent a similar scenario in other species, the office is working in coordination with the Wisconsin Pork Association, Wisconsin Milk Marketing Board, and other industry groups to

gauge and prepare for emerging threats. A recently launched swine health program in the state, for example, will require testing and institute quarantine and herd planning protocols for two diseases: porcine reproductive and respiratory syndrome and porcine epidemic diarrhea virus, which in 2013, in its first appearance in the United States, caused the death of approximately 9 million baby pigs across 38 states.

"The industry came to us and said we want help, so we've been able to partner with them to develop regulations," says McGraw.

Disease Surveillance

McGraw, Konkle, and the Division of Animal Health's veterinarians, inspectors, compliance staff, and other personnel utilize an arsenal of defenses against outbreaks. These include frequent workshops and drills on disease control and prevention and emergency preparedness for staff and collaborators; the administration of licenses for those who raise, sell, or transport animals in Wisconsin; and the enforcement of regulations requiring a veterinary examination and health certificate for all animals entering the state.

"We have health requirements and identification requirements so we can do trace-back when we do find a disease," says McGraw.

As a recent example, when the office learned that 18 beef cattle in two Wisconsin herds may have come from a tuberculosis-infected facility in South Dakota, a review of the cows' health papers allowed for swift tracking and testing. In addition, in the aftermath of last year's hurricanes in Texas, Florida, and Puerto Rico, staff have coordinated with local humane societies and animal rescue organizations to uphold Wisconsin import requirements preventing the entry of heartworm-positive dogs into the state, unless the animal has received the approved treatment protocol and veterinary inspection – helping to both protect the companion animals already in the state and safely aid in the relocation of displaced pets.

On the other hand, when regulations are not followed, disease response can be stymied and health threatened. In the spring of 2017, a strain of hantavirus was detected in rats in Wisconsin after an investigation revealed that the people who became sick and were hospitalized with the virus also owned or bred pet rats.

“In this case, some of the rats did not have proper documentation – an example of why we require health papers, so we can assist with traceability,” explains McGraw. “If they all had that health certificate, it would have helped our public health partners identify other potential rat owners. That disease was a public health risk.”

Health Partners

Collaboration with public health agencies and practitioners provides important reinforcements in a vigilant front against disease threats.

In 2016, for instance, during an outbreak of multidrug-resistant *Salmonella* Heidelberg across several states, an epidemiological investigation revealed that all of the infected people shared a common contact with dairy bull calves that originated in Wisconsin. McGraw and his office were alerted and took steps to determine if certain practices at the farms of origin may have contributed to the bacteria’s antimicrobial resistance. As follow-up, the office is also now working with the U.S. Department of Agriculture, Wisconsin Veterinary Diagnostic Laboratory, and farms in the state to further identify and prevent potential risk factors.

“There are opportunities here with stewardship of antimicrobial use, so we don’t get into a situation where animal agriculture is contributing to resistance,” says McGraw.

“In veterinary medicine and in our office, it has become clear that animal health, human health, and environmental health are all connected – the idea of one health,” adds Konkle. “We’re constantly on the lookout for changes, adapting,



Modern global connectivity, combined with recent U.S. outbreaks of foreign animal diseases such as avian influenza, “certainly does not help state veterinarians sleep any better” says Wisconsin state veterinarian Paul McGraw DVM’88.

and trying to be on the forefront of best practices to move animal health and public health further forward.”

From the Wisconsin Department of Natural Resources to UW Extension to the Wisconsin Veterinary Medical Association, a number of other partner agencies help to bolster the office’s efforts through education, outreach, and more.

Veterinarians in private practice are also a critical ally. “We rely on well-trained, observant private veterinarians to be the eyes and ears on the ground and to let us know if they see something unusual and want us to take a look,” says Konkle.

Both McGraw and Konkle emphasize the value in raising awareness of connections to regulatory medicine among today’s veterinary medicine students.

“Having the opportunity to get into classrooms throughout their four years in vet school has really helped us get the message out that they’re our partner and will be when they get out to practice,” says McGraw.



A Chance to Help

The Department of Agriculture, Trade and Consumer Protection established the **Wisconsin Animal Response Corps** to respond to disease outbreaks and natural disasters or other emergencies. The corps consists of specially trained veterinarians, veterinary technicians, and veterinary students; livestock producers; animal caregivers; and animal handlers.

For more information on the program and ways to get involved: datcp.wi.gov/Pages/Programs_Services/WARC.aspx.



Yoshihiro Kawaoka, Peter Halfmann and Alhaji Njai stand outside of a military hospital with Foday Sahr, a Sierra Leone military official and chair of microbiology at the University of Sierra Leone.

By Kelly April Tyrrell

Signatures of Ebola

IN THE HEART OF DEVASTATING OUTBREAK, RESEARCH TEAM UNLOCKS SECRETS OF DISEASE

In a comprehensive and complex molecular study of blood samples from Ebola patients in Sierra Leone, a scientific team led by UW–Madison has identified signatures of Ebola virus disease that may aid in future treatment efforts.

Conducting a sweeping analysis of everything from enzymes to lipids to immune-system-associated molecules, the team found 11 biomarkers that distinguish fatal infections from nonfatal ones and two that, when screened for early symptom onset, accurately predict which patients are likely to die.

With these results, published in November in the journal *Cell Host & Microbe*, senior author **Yoshihiro Kawaoka**, a virology professor at the UW School of Veterinary Medicine (SVM), says clinicians can prioritize the scarce treatment resources available and provide care to the sickest patients.

Studying Ebola in animal models is difficult; in humans, next to impossible. Yet, in Sierra Leone in 2014, a natural and devastating experiment played out. In September of that year, an Ebola outbreak like no other was beginning to surge in the West African nation. By December, as many as 400 Ebola cases would be reported there each week.

That fall, Kawaoka sought access to patient samples. He has spent a career trying to understand infectious diseases like Ebola — how do they make people sick, how do bodies respond to infection, how can public health officials stay at least a step ahead?

Yet blood samples were proving difficult to obtain and people continued to die.

Then, just weeks before Christmas, Kawaoka learned about a colleague in the Department of Pathobiological Sciences at the SVM, a research fellow from Sierra Leone named **Alhaji**

N’jai, who was producing radio stories for people back home to help them protect themselves from Ebola. The pair forged a fortuitous partnership.

“He knows many people high up in the Sierra Leone government,” says Kawaoka.

By Christmas, Kawaoka, N’jai, and **Peter Halfmann**, a senior member of Kawaoka’s team, were in Sierra Leone.

“On the first trip, Alhaji took me to Parliament and we talked to a special advisor to the president, then the vice chancellor of the University of Sierra Leone,” says Kawaoka. “We got the support of the university, which helped us identify military hospitals and provided space. We went to the Ministry of Health and Sanitation and the chief medical officer and we explained what we hoped to do.”

By February of 2015, Kawaoka and other select senior researchers on his team, including **Amie Eisfeld**, set up

a lab in a military hospital responding to the outbreak in the capital city of Freetown (the researchers never entered patient wards). With the approval of patients and the Sierra Leone government, health workers collected blood samples from patients after they were diagnosed with Ebola and at multiple points thereafter.

They obtained 29 blood samples from 11 patients who ultimately survived and nine blood samples from nine patients who died from the virus. The samples were transported to the lab where Kawaoka's experienced and expertly trained team inactivated the virus according to approved protocols. Blood samples were subsequently shipped to UW-Madison and partner institutions for analysis.

For comparison, the research team also obtained blood samples from 10 healthy volunteers with no exposure to Ebola virus.

"Our team studied thousands of molecular clues in each of these samples," says Katrina Waters, a biologist at Pacific Northwest National Laboratory and a corresponding author of the study. "This may be the most thorough analysis yet of blood samples of patients infected with the Ebola virus."

The team, which also includes researchers from Icahn School

of Medicine at Mount Sinai, the University of Tokyo, and the University of Sierra Leone, found that survivors had higher levels of some immune-related molecules, and lower levels of others compared to those who died. Plasma cytokines, which are involved in immunity and stress response, were higher in the blood of people who perished. Fatal cases had unique metabolic responses compared to survivors, higher levels of virus, changes to plasma lipids involved in processes like blood coagulation, and more pronounced activation of some types of immune cells.

Pancreatic enzymes also leaked into the blood of patients who died, suggesting that damage from these enzymes contributes to the tissue damage characteristic of fatal Ebola virus disease.

And, critically, the study showed that levels of two biomarkers, known as L-threonine (an amino acid) and vitamin D binding protein, may accurately predict which patients live and which die. Both were present at lower levels at the time of admission in the patients who ultimately perished.

"We want to understand why those two compounds are discriminating factors," says Kawaoka. "We might be able to develop drugs."

When Ebola virus leads to death, experts believe it is because of overwhelming viral replication. Symptoms of infection include severe hemorrhaging, vomiting and diarrhea, fever, and more.

Kawaoka and his collaborators hope to better understand why there are differences in how patients' bodies respond to infection, and why some people die while others live. The current study is part of a larger, multicenter effort funded by the National Institutes of Health.

"I hope another outbreak like this never occurs," says Kawaoka. "But hopefully this rare opportunity to study Ebola virus in humans leads to fewer lives lost in the future."



Kawaoka meets with Ekundayo Thompson, vice chancellor of the University of Sierra Leone.

Movies and Messaging

Professor Yoshihiro Kawaoka's work did not stop with the one large, comprehensive study of Ebola. In March 2017, he and his team were back in Sierra Leone to participate in community public health events. While there, Kawaoka collected 634 blood and serum samples from Ebola virus survivors and close contacts of theirs who never got sick.

"We partnered with Sony in Sierra Leone to host a public viewing of a movie and included public health messaging: What to do and not do with Ebola," says Kawaoka. "We also followed up with survivors and their close contacts because one of the things we want to know is why are some people exposed but do not show symptoms?"

The event was coordinated by Project 1808, a Madison, Wisconsin-based nonprofit, founded in 2009 by SVM research scientist Alhaji N'jai. He and a colleague wrote scripts for short commercials about infectious diseases to screen between film showings and hired local actors to produce them in their languages.

For Kawaoka, the experience was rewarding. It was a chance to work with the local communities that have allowed him to pursue his Ebola research and it could yield invaluable information that could be critical to vaccines or drugs used to treat people in the future.



A vial is labeled and prepared to hold blood from an Ebola patient in Sierra Leone.

Comparatively Speaking

Chimpanzee Deaths in Uganda Pinned on Human Cold Virus

In the wild, chimpanzees face any number of dire threats, ranging from poachers to predators to deforestation.

That's why scientists, investigating an outbreak of respiratory disease in a community of wild chimpanzees in Uganda's Kibale National Park, were surprised and dismayed to discover that a human "common cold" virus known as rhinovirus C was killing healthy chimps.

"This was an explosive outbreak of severe coughing and sneezing," says **Tony Goldberg**, a professor of pathobiological sciences at the UW School of Veterinary Medicine and one of the senior authors of a report documenting the event. The report was published online in December in the journal *Emerging Infectious Diseases*.

"It was completely unknown that rhinovirus C could infect anything other than humans," says Goldberg, referencing a two-year-old chimp named **Betty**, who succumbed to the virus and whose body was quickly recovered and autopsied after her death. "It was surprising to find it in chimpanzees, and it was equally surprising that it could kill healthy chimpanzees outright."

The outbreak occurred in February of 2013 and affected most of the chimps in the community. During that time, five chimps out of a community of 56 died, including Betty; the other animals that died were adults up to 57 years old. The findings, says Goldberg, are a cautionary tale about human interactions with wild apes. In Africa, people encounter chimpanzees and other apes when human settlements expand into ape habitats, through activities like tourism and research, and when apes leave the forests to raid crops.



RONAN DONOVAN

UW-Madison epidemiologist Tony Goldberg investigating primate disease in Africa.

From the CBMS Director

A Program of Distinction



This past year was highly successful for the Comparative Biomedical Sciences (CBMS) graduate program in terms of recruitment and graduation. An incoming class of 22 students (10 master's and 12 doctorate students) joined the CBMS program and 14 students successfully earned their doctoral degrees in 2017.

In addition, CBMS once again ranked in the top 10 for the veterinary medical sciences discipline for its research performance in 2016-17, according to the Academic Analytics Database – a distinction the program

has received for many consecutive years. CBMS is one of 51 graduate programs nationwide in veterinary medical sciences. This notable achievement is reflective of our integrative program's sustained academic excellence.

Given the exceptional talent level of our students, faculty, and staff, I am confident that we will sustain this success into the future.

M. Suresh

Professor, Department of Pathobiological Sciences
Director, Comparative Biomedical Sciences graduate program

Rhinovirus C is one of three rhinovirus species, each causing respiratory disease in humans. But rhinovirus C is notably more severe than its relatives, rhinoviruses A and B. Although the virus had likely been infecting people for several thousand years, it was unknown to science until 2006, when it was discovered using new DNA sequencing technologies.

In people, rhinovirus C infection can be especially severe in children, notes **James Gern**, another senior author of the study and a professor of allergy and immunology in the UW School of Medicine and Public Health. Gern's lab was the first to grow rhinovirus C in the laboratory where it could be studied. His lab also described the receptor that the virus uses to infect cells of the respiratory system.

Gern explains that the genetics of the receptor — which serves like a lock-and-key mechanism that allows the virus to enter and infect a host cell — influences who is likely to be most affected by the virus. Some people have a version of the receptor that makes them highly susceptible to the virus while others have a different version that makes them resistant. For some people (young children, in particular) rhinovirus C infection can be a precursor or complicating factor for asthma.

“Chimps seem to be genetically predisposed to have problems with this virus,” Gern says. “The virus found in Betty was one that looked like it came from a human, and the level of virus in the lung was comparable to what we see in children.”

The authors were also able to examine the DNA of the chimps in Uganda using fecal samples, and they looked at published chimp genomes from across Africa. Goldberg says it was sobering to see that every chimp had the receptor that makes cells exquisitely sensitive to rhinovirus C. “There's a species-wide susceptibility of chimps to this virus,” says Goldberg.

Ann Palmenberg, a UW–Madison professor of biochemistry and an authority on cold viruses, says the genome of the virus obtained from Betty shows that the virus came from a human host. Also a senior author of the study, Palmenberg says the virulence of the virus, with about a 9 percent mortality rate, was remarkable. “That's why kids with the CDHR3 high-risk mutation are at increased risk for being hospitalized with severe respiratory illness.”

Goldberg, who has worked in Uganda for years tracking viruses in animals, says outbreaks of respiratory disease in wild chimpanzees are not uncommon, but for the most part they go undiagnosed. In the few cases where causes have been identified, other viruses unrelated to rhinovirus C have been in play.

“In most cases, we don't find out what it is. We're thinking that rhinovirus C might be a major, missed cause of disease outbreaks in chimps in the wild,” Goldberg notes.



This 2-year-old chimp named Betty succumbed to a human common cold virus in Uganda.

Unlike other viruses known to cause respiratory disease in chimps, though, rhinovirus C is not typically found in feces and may have been overlooked in the past.

Finding rhinovirus C as the cause of the 2013 outbreak in Uganda was part good luck, says Goldberg. The opportunity to retrieve Betty's body before it decomposed or scavengers set in was critical. So, too, were Goldberg's colleagues at Harvard and the University of New Mexico, who run a long-term chimp study in Kibale and can identify all the chimps in the community. This, plus the fact that a Ugandan veterinarian was on hand with the proper tools to obtain and secure samples through a post mortem in the field, made the discovery possible, he says.

Terry Devitt

In Memoriam

Robin Mittenthal, who served as coordinator of the Upper Midwestern Regional Center of Excellence for Vector-Borne Disease housed at UW–Madison, died suddenly in December following an accident at his farm. Mittenthal coordinated program partners in five states and tracked the center's progress in addressing vector-borne disease challenges. **Lyric Bartholomay**, an associate professor of pathobiological sciences at the UW School of Veterinary Medicine and co-director of the vector-borne disease center, said of Mittenthal: “Robin gave us his time, his undivided attention, his radiant smile, his stories that spanned an unbelievable repertoire of life experiences, his infectious enthusiasm, his thanks, and his encouragement.”



Overhead view of the 2017 Treinen Farm corn maze, designed by Angie Treinen DVM'93.

Field of Fossils

Bug-like and armored, with as many as 100 legs, trilobites once cruised the planet's seas, including those that covered Wisconsin. This now-extinct marine creature is now the state fossil. It was also the defining feature of the latest Treinen Farm corn maze in Lodi, designed by **Angie Treinen DVM'93**.

"I consider myself an artist and my medium is corn, with a 15-acre field as my canvas," she says. See a bird's-eye view of the maze in an overhead video: go.wisc.edu/corn-maze-video

In Memoriam

Mark Brownfield, associate professor emeritus in the Department of Comparative Biosciences, passed away in November after a brief illness. Brownfield devoted his career to the School of Veterinary Medicine (SVM) and UW–Madison for 35 years. He taught Endocrine Physiology to every SVM class from the school's very first students through his retirement in 2016 and continued to direct a research lab. Per his family's request, donations to the SVM Scholarship Fund can be made in Brownfield's honor at supportuw.org/giveto/vetmedscholarship.

A Message to DVM Alumni

Saving Lives and Serving Wisconsin (and Beyond)



One of my great frustrations is that not enough people understand how important veterinarians are – whether they own a pet or not. I know I don't need to explain to you how critical your profession is to both animal and human health. Not only do you save the lives of beloved animal companions, you play

an important role in food quality and safety, public health, wildlife conservation, and human health advancements.

As we move forward in our building expansion campaign, Animals Need Heroes Too, we've increased our efforts to share this message more broadly, particularly in Wisconsin. This will be very important as we seek state support for our building project in the 2019-21 budget. We've begun some radio advertising, initially during the UW men's basketball games, and will be traveling around the state to meet with UW–Madison alumni groups, community leaders, and others to discuss how important the School of Veterinary Medicine is

to animal and human health and to Wisconsin's dairy industry.

I invite you to help us with these efforts. If you are a member of a local civic group, active in your local VMA, or connected with community leaders, please let me know (kristi.thorson@wisc.edu or 608-265-9692). We would welcome the opportunity to discuss how the UW School of Veterinary Medicine is saving lives and serving Wisconsin. And we hope you will join us in letting others know how veterinarians matter to animal and human health.

Thank you for all you do. I look forward to more people appreciating how important you are.

Kristi V. Thorson

Associate Dean for Advancement and Administration

P.S. I would be remiss if I didn't mention that the Morrie Waud "SVM Family" match is still available to you through June 30, 2018. This is another great way to support the school! To learn more, visit vetmed.wisc.edu/morriewaudmatch.

Awards & Honors

Easterday, Hyland Honored with WVMA President's Award

Two founding faculty and staff members of the UW School of Veterinary Medicine (SVM) – Emeritus Dean **Bernard Easterday MS'58, PhD'61** and **Susan Hyland MS'73 PhD'78** – were honored with the 2017 President's Award from the Wisconsin Veterinary Medical Association (WVMA) at the organization's annual convention in October in Madison.

The award is presented by the outgoing WVMA president to a person or company that has provided extraordinary service or assistance to the organization.

Outgoing WVMA President **Scott Spaulding DVM'91** noted the pair's leading role in the creation of the UW SVM and their long legacy, which continues today, in advising and mentoring veterinary medical students.

"Barney and Sue have become lifelong friends and advisers to not only

myself but literally hundreds of veterinary medical students at the UW," Spaulding said in his speech introducing the award.

Easterday and Hyland were part of a team that between 1979 to 1983 coordinated the academic planning, recruitment of faculty and staff, and facilities construction necessary for the establishment of the School of Veterinary Medicine at UW–Madison. Easterday is the founding dean of the school, which welcomed its inaugural class in 1983. Hyland served as the first associate dean for academic affairs.

"The passion, the vision, the tenacity of Barney and Sue, along with those other members of the founding group that I didn't know so well, set into motion the evolution of one of the world's leading schools of veterinary medicine," Spaulding continued in his speech at the WVMA convention.



Scott Spaulding DVM'91 (center), outgoing president of the Wisconsin Veterinary Medical Association (WVMA), presented the 2017 WVMA President's Award to Susan Hyland MS'73 PhD'78 (left) and Bernard Easterday MS'58, PhD'61 (right).

"The foundation laid by this group became a veterinary clinic, designed to handle 12,000 annual patient visits, which now handles nearly 30,000 annual patient visits," he added. "The teaching and research demands on the school have stretched the facility's limits and plans are in the works for a \$115 million facility expansion – what a remarkable feat, what a remarkable accomplishment."

Sherman Named WVTA Veterinary Technician of the Year

Kim Sherman, a certified veterinary technician in the Ophthalmology Service at UW Veterinary Care, received the 2017 Veterinary Technician of the Year Award from the Wisconsin Veterinary Technician Association (WVTA). The award honors those who demonstrate outstanding leadership and support for veterinary technicians and the advancement of the field of veterinary technology.

Sherman was nominated by her long-time colleague, **Ellison Bentley**, clinical professor of comparative ophthalmology at the School of Veterinary Medicine.

When asked what qualities a good vet tech should demonstrate, Sherman said, "For me, everything revolves around working together harmoniously. We all know what needs to happen and we all work toward that goal. On a daily



Kim Sherman, recipient of the 2017 Veterinary Technician of the Year Award from the Wisconsin Veterinary Technician Association.

basis, it's about communicating with team members and clients and paying attention to the details. If I am doing my job well, my work is invisible."

Denise Garlow

Other Notable Honors

Two scientists from the UW SVM Department of Pathobiological Sciences, **Yoshihiro Kawaoka** and **Gabi Neumann**, are among the 2017 Highly Cited Researchers list in the microbiology category, ranking in the top one percent by citations for field and publication year in Web of Science.

Laurel Meyers DVMx'19 received third place in the national Student American Veterinary Medical Association One Health Grand Challenge for her efforts in developing and organizing the Wisconsin One Health Forum and UW–Madison One Health Day Colloquium. One Health is a collaborative effort of multiple health science professions to attain optimal health for people, animals, and environments.



MEGHAN LEPISTO (2)

At A Glance

Class name: Veterinary Histology

Credit hours: 5

Structure: Three 50-minute lectures and two three-hour labs each week

Taught by: Lecturers Liz Jacka and Stephanie Evenson and Professors Lisa Arendt, Ruth Sullivan, and Ted Golos

On the syllabus: Structural and functional aspects of cells and tissues

An Atlas of Microscopic Anatomy

Understanding the intricacies of cellular-level architecture is one of the first items on the agenda for UW School of Veterinary Medicine students.

Amongst a suite of required courses to be taken during the first semester of the first year of curriculum is Veterinary Histology. Across 16 weeks, students examine the microscopic anatomy of the entire mammalian body through the close inspection of 250 microscope slides containing various tissue samples.

“It’s important because everything that happens within the body under normal circumstances or in disease happens at the level of the cell, and it’s changes in the cells that lead to disease in an organ,” explains course coordinator and instructor **Liz Jacka DVM’10**.

The course content is rigorous, but a digital platform implemented by **Ted Golos**, professor and chair of the Department of Comparative Biosciences, and **Albee Messing**, professor emeritus,

has made it more accessible. Over the past several years, digital images of all of the microscope slides that are part of the curriculum have been scanned at very high resolution and uploaded to an online platform.

“It’s become a critical, integral tool,” says Jacka. “What we have is essentially the same thing you’d look at on a microscope, except on a digital platform. You can zoom in the same way you’d be able to on a microscope and see all the cells.”

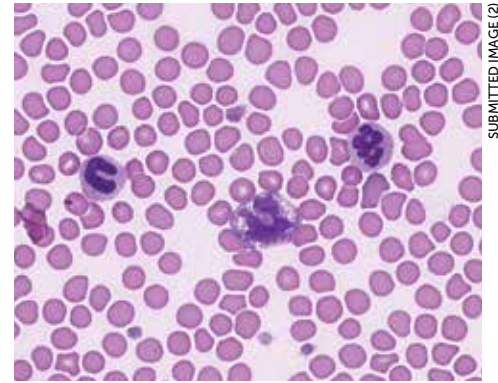
The online system brings several advantages. First, it allows students to view the images whenever and wherever with an Internet connection, whereas in the past students were limited to viewing the slides on microscopes in the Veterinary Medicine Building.

“Now students can study at home. It’s a huge advantage that way,” says Jacka. “And students love how they can always have a reminder of what something looks like.”

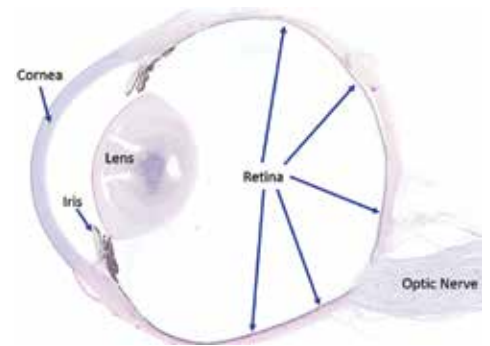
In addition, labels and annotations from instructors in the digital platform mark important features and examples at specific slide locations. “It’s helped the students enormously,” Jacka notes. “You can’t label things on a glass slide, so before students would struggle to figure out what they were trying to look at. Now they can go to the digital scan, see ‘Oh, this is what we need to find,’ and then find that on their slide.”

The course instructors see the digital platform as a complement to viewing slides on a microscope, not as a replacement. In the class’s twice-weekly labs, students work in pairs to study digital scans online and physical slides under the microscope, referring back and forth between the two modes and gaining the benefits of both.

“It’s a little bit new world and old world,” says Jacka. “The students are all very digitally oriented, so they really like having that utility. At the same time, they will definitely use microscopes in



SUBMITTED IMAGE (2)



the clinic, so we give them familiarity with the concepts they need as a solid foundation for doing so.”

Likening the new online system to a Google Maps of cellular microanatomy, Golos says it has improved the flow and efficiency of class, allowing students to clarify questions quickly and ask more complex queries because they can dive into greater detail. An extensive bank of study questions in the platform also helps to generate further discussion.

Student **Preston Cernek DVMx’21** echoes this. “We spend a lot less time searching for things and a lot more time studying the actual characteristics.”

In addition, instructors are no longer limited to having the entire class take turns viewing a single slide.

“When we first started teaching this course, we had ‘demonstration microscopes’ set up in the lab and students would go from one station to another when they were available,” says Golos. “Now if we have a unique

specimen, we can scan it so all can see.”

UW Veterinary Care clinicians frequently visit the class to present real-life patient scenarios and the detailed anatomy behind them, helping students see the direct correlation between histology and their future careers and clinical cases. For example, during a recent lab session, **Ellison Bentley**, clinical professor of comparative ophthalmology, compared images of eye abnormalities commonly seen among patients to the normal cellular-level details of the eye that students were studying that day. “An understanding of anatomy facilitates the interpretation of exam findings,” Bentley told the students.

“The goal of the clinical correlations is to show students why they need a solid foundation in this subject to understand when things go wrong with their patients – to tie in why clinicians need to know histology in order to address a case,” says Jacka.

Meghan Lepisto

Page 20: Professor Ted Golos, right, helped to implement the digital platform used by students in the Veterinary Histology course. Likening it to a Google Maps of cellular microanatomy, the platform hosts high-resolution scans of all of the microscope slides that are part of the curriculum.

Page 21

Left: Students in a Veterinary Histology lab session view slides of tissue samples through both a microscope and online platform. Incorporating the new digital system has improved the flow and efficiency of class and helped to generate further discussion and exploration.

Top right: A band neutrophil, platelet, segmented neutrophil, and monocyte (clockwise from far left to right) can be seen in this smear of blood on a scanned microscope slide. In the first semester of their first year of curriculum, SVM students study cellular-level anatomy through the five-credit Veterinary Histology course.

Bottom right: The normal cellular-level details of the eye are shown here at low magnification in a labeled digital slide – an example of the microscopic anatomy that students study in Veterinary Histology.

Patient Profile



835 More Days with Dutch

Last fall, the School of Veterinary Medicine and hospital director Ruthanne Chun received a letter of gratitude from the Leahey family, whose Golden Retriever Dutch had received treatment for lymphoma at UW Veterinary Care. Sadly, Dutch passed away in February 2017, but his memory lives on in a nearly daily documentation of his life and his journey through cancer treatment on the photo-sharing application Instagram. In honor of Dutch, an excerpt of the Leahey's letter follows, accompanied by several of their snapshots of him.

Dear Dr. Chun,

We'd like to express our profound gratitude to the oncology team for their kindness, professionalism, and dedication to the fight against cancer. Our dog, Dutch, was a very important member of our family and from our first visit in the fall of 2014 when he was diagnosed with lymphoma, it felt like he was welcomed into the UW Vet Med family. From that first trip and each visit thereafter, the team far exceeded our expectations with the care he received.

We developed a routine over the last two years traveling from Chicago and staying in Madison. During this time, Dutch developed a close bond with the team as he was always eager to make the trip and have his friends waiting to greet him – everyone was so kind, from the staff at the front desk checking us in, to the techs, and of course, above all, the vets. We know they were key to Dutch's tremendous success in battling lymphoma.

At our first appointment, we understood the odds were not great and that with treatment Dutch may potentially survive an additional six to twelve months. We were very fortunate as he survived over two years from his diagnosis. To be exact, we are thankful to the UW vet staff for the 835 additional days we had to spend with him. (We documented just about each of those days on Instagram: [instagram.com/5280jordan](https://www.instagram.com/5280jordan)).

We would also like to thank Dr. Schaffer, Dr. Pellin, and Dr. Miller as they were the primary vets treating Dutch over the course of his battle. In particular, Dr. Schaffer – she understood how challenging some decisions were for us but helped us as laypeople understand all of our options. She is personable, caring, and we and Dutch felt very safe with her.

We will always remember the kindness, care, and wonderful service from the team and we are truly grateful to you all.

Sincerely,
Jordan and John Leahey

Your legacy. Their future.

Including the University of Wisconsin School of Veterinary Medicine in your will is an opportunity to shape the future of veterinary medicine. Your estate gift can support the greatest needs or it can support something of particular interest to you such as student scholarships, the UW Veterinary Care teaching hospital, our research mission and more.

What will your legacy be?

To learn more about including the School of Veterinary Medicine in your will or to discuss other planned gift options (charitable gift annuities, real estate gifts, etc.) contact **Pat Bowdish at 608.294.7661 or pat.bowdish@supportuw.org**.



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10 Most Popular Names Among UW Veterinary Care Patients*

1. Bella
2. Max
3. Lucy
4. Molly
5. Charlie
6. Buddy
7. Daisy
8. Bailey
9. Jack
10. Maggie



*During the last five years.
Reprinted from the Winter 2017 issue of *On Wisconsin* magazine.