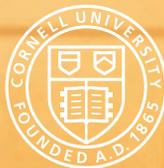


RESEARCH GETS REAL

CVM SCIENTISTS STAY AT THE CUTTING EDGE

SUMMER 2017

SCOOPES



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College of Veterinary Medicine

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'SCOPES SUMMER 2017

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Diversity and Inclusion are a part of Cornell University's heritage. We are a recognized employer and educator valuing AA/EEO, Protected Veterans, and Individuals with Disabilities. Produced by Cornell University 8/17 FLP 6.8M

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DEAN'S MESSAGE

“ONE OF THE MOST REWARDING PARTS OF OUR WORK IS TO WATCH DISCOVERY UNFOLD AS AN OBSERVATION IN CLINICAL PRACTICE LEADS TO AN EPIDEMIOLOGICAL STUDY OF A NATURALLY OCCURRING DISEASE, FOLLOWED BY EXPERIMENTS TO ELUCIDATE THE CAUSES AND POTENTIAL TREATMENTS.”

UNDERGRADUATE STUDENT FRAZ LUGAY
AT WORK IN THE LIBERT LAB.

SCIENCE AT CVM

Dr. Lorin Warnick,
Austin O. Hoey Dean of Veterinary Medicine



Summer is a beautiful time of year in Ithaca, and, with many of the students gone, things can seem to go at a slower pace around the Cornell campus. But things are still very busy at the College with our main construction project moving towards completion in late summer, and our year-round clinical programs, summer programs, summer courses, and research training programs in full swing. Research, of course, never slows down at the College either. This issue of ‘Scopes is dedicated to the scientific discovery that’s done in the lab, field, and clinic every day by our researchers.

In science, one size does not fit all. Discovery varies by numerous factors, each variable possessing its own challenges and benefits. Research can vary by timeline: from the basic research that often requires a long-term investment and may lay the foundation for future applications not recognized at the time the work is done; to mid-term efforts such as clinical trials which provide evidence-based underpinning to clinical practice; to short-term responses that address emerging diseases and other acute needs.

Research can also be observational or experimental—observational research informs us about the world as it is, for example, pinpointing cellular pathways that handle oxidative stress, or understanding how dairy cow social behavior affect disease transmission. This type of investigation often frames the questions for experimental research that follows. Researchers in the College conduct observational studies both prospectively—collecting data as patients are examined or in livestock and wildlife populations, or retrospectively—using our extensive collection of medical records. Experimental research informs us about the world when we intervene, and offers the best opportunity to establish cause-and-effect relationships: does injecting this peptide into a joint prevent arthritis? Will exposing a stem cell to inflammatory stimuli initiate cancer? One of the most rewarding parts of our work is to watch discovery unfold as an observation in clinical practice leads to an epidemiological study of a naturally occurring disease, followed by experiments to elucidate the causes and potential treatments.

All these variations of scientific discovery have vital importance, and no one type of research effort can or should exist without the others. Too often, however, the essential roles and reasons for these approaches are lost on the general public. Now more than ever, it requires patient and thoughtful advocacy and communication by those who understand and value scientific inquiry in all its forms.

While the public’s critique and support is important, many researchers in the trenches are likely more preoccupied with another audience—peer-reviewers. This process serves to improve the quality of our research, both for grants—which fund our efforts, and for publications—which communicate the results to the scientific community and public. The peer-review process is critical in ensuring the impact of research though not without some risk of preserving prevailing wisdom and slowing recognition of paradigm-changing discoveries.

While scientific discovery is a core responsibility of the College in its own right, it is also important to recognize its importance in sustaining the other key missions of learning and clinical and diagnostic service. The educational connection to our research is present throughout our College—our discoveries are done with the participation of veterinary and graduate students, post-doctoral fellows, and undergraduate students—who in turn receive the exceptional mentorship and training an institution like Cornell can offer. Research informs the instruction of faculty in all of our educational programs, from the veterinary curriculum to graduate and undergraduate courses.

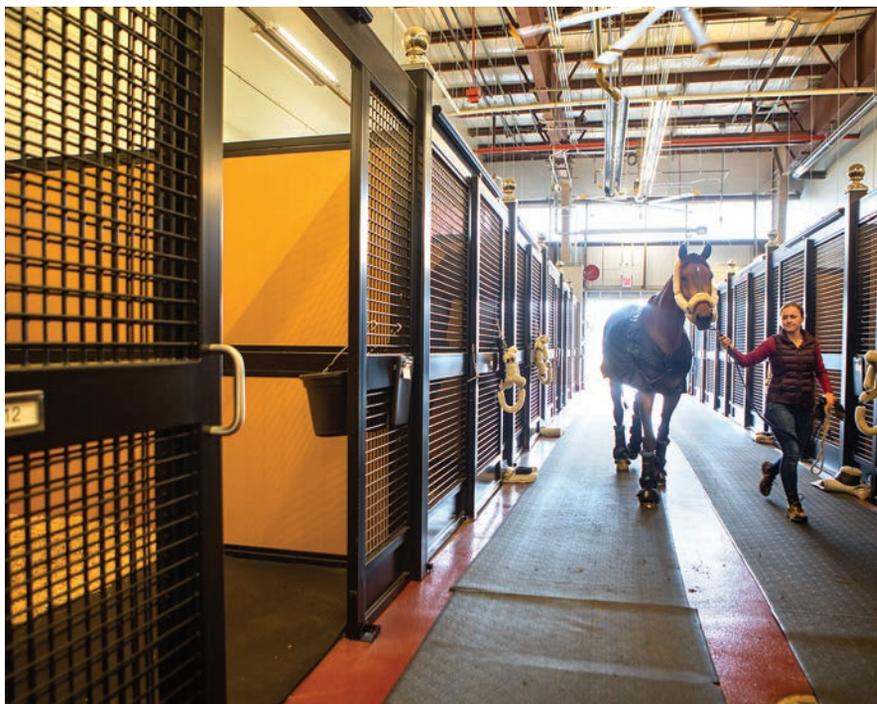
Our clinical and diagnostic service is also informed by the constant stream of studies that slowly lead to better treatments and tests for our patients—and in turn, our patients can provide vital data in the way of samples or clinical trials to help move these studies forward.

While we only have the space in this issue to showcase a snapshot of the research being done at the College, I trust you’ll be as impressed, as I am, at the breadth and depth of scientific endeavors carried out by CVM scientists and the impact their work is having on veterinary medicine and human health.

Lorin D. Warnick

CORNELL VETERINARIANS LEAD ‘PET OASIS’ ON THE JFK TARMAC

By Jon Craig



THE ARK AT JFK

In June, Cornell veterinarians helped open a new animal care and import-export center at John F. Kennedy International Airport called The ARK.

JFK is the third U.S. airport equipped to receive, vaccinate and shelter birds, horses, cats, dogs, and other animals arriving or departing on international flights. The other airports authorized to receive animals are in Miami and Los Angeles. People traveling through JFK can have their pets examined, treated, fed, walked and boarded in the event of illnesses or flight delays.

Lauren Neuendorf Jordan '11, DVM '15, started her new job June 5 as medical director of AirHeart Pet Hospital at JFK ARK. Dr. Linda D. Mittel, a senior extension associate at the Animal Health Diagnostic Center at the College and expert in infectious diseases,

consulted on the facility's state-of-the-art biosecurity designs and helped establish protocols for handling any animal without proof of vaccinations or showing signs of illness.

Mittel estimated that 3,000 to 4,000 horses will travel in or out of JFK annually, and a total of 10,000 to 15,000 animals will pass through the international airport in Queens, N.Y. (Number totals are imprecise since some pets are classified as “carry-on baggage.”) Mittel said animals are quarantined for three to 30 days depending on where they originated and their physical condition and vaccination records. The ARK's staff is ever-vigilant for rare and contagious diseases, Mittel said, working closely with the U.S. Centers for Disease Control.

The ARK's \$65 million “pet oasis” is located on 14 acres at JFK. Since the

“WE ARE RIGHT ON THE TARMAC. THEY CAN BE IN OUR FACILITY WITHIN AN HOUR.”

—DR. LINDA D. MITTEL

opening of the first phase of the project in January, the center has housed horses, dogs, cats, rabbits, turtles, mice, goats, and other animals. “We are right on the tarmac. They can be in our facility within an hour,” Mittel said.

In addition to consulting on the project, veterinarians at Cornell Ruffian Equine Specialists, located seven miles away in Elmont, N.Y. are on call to consult on horses in distress or needing medical attention.

The center features in-transit companion animal kennels, boarding, veterinary and diagnostic services. The final phase of the project, which includes a 24/7 veterinary clinic and long-term pet boarding facility, will be fully operational by the fall.

This article originally appeared in the Cornell Chronicle.

DR. JODI KORICH '97 JOINS COLLEGE AS ASSOCIATE DEAN FOR EDUCATION

Dr. Jodi Korich '97, has started as the Associate Dean for Education in the College of Veterinary Medicine. In her new role, Korich has primary responsibility for the College's education programs, continuing education and distance learning. She will also work in close partnership with other College leaders to provide vision and leadership to ensure excellence in our educational programs and to meet the changing needs of the students, the profession, and society.

"I am excited to have her join our team and am confident that she will provide excellent vision and guidance for educational programs in the College," said Dean Lorin Warnick.

Korich comes to the College of Veterinary Medicine from Texas A&M University where she was the founding director of the Center for Educational Technologies and clinical associate professor in the College of Veterinary Medicine & Biomedical Sciences.

After earning her DVM at Cornell, she spent five years in clinical practice in Fairfax, Va., and then returned to Cornell 2002 through 2010 as an instructor and senior extension associate in the Department of Clinical Sciences. "As a member of the class of 1997 and a former faculty member, Cornell and Ithaca is a place I know and love," said Korich. "I am grateful to once again have the opportunity to contribute my knowledge, skills, and passion for education to the College community."

"I AM GRATEFUL TO ONCE AGAIN HAVE THE OPPORTUNITY TO CONTRIBUTE MY KNOWLEDGE, SKILLS, AND PASSION FOR EDUCATION TO THE COLLEGE COMMUNITY."

—DR. JODI KORICH '97



DR. JODI KORICH '97

CAPITAL EXPANSION UPDATE



The Class Expansion construction project continues to move along very well. The new building, which comprises two new 150-seat lecture halls, two 60-seat flat classrooms, a new cafeteria, library, modular resource center, and the new Takoda's Run Atrium, is scheduled to be substantially completed and turned over to the College for occupancy on August 25, 2017, and opening for classes and building use is anticipated to begin the week of September 4–11, 2017. The new interior courtyard and pet walk area is now landscaped with mature trees, shrubbery, flowers, and turf while the new CVM Tower Road entrance is expected to open on or before October 9. A new poisonous plant garden will also open in early September.

Additionally, the Community Practice Service building construction has begun, with the foundation work currently underway and underground utilities to follow. Anticipated completion is May 2018.

"While there's still more work to be done, we're pleased with the progress we've had so far with all of these capital expansion efforts," says Wayne Davenport, director of facilities and capital projects. "We look forward to students, staff and faculty getting their first look at these spaces when the new school year starts."

DR. CYNTHIA LEIFER RECEIVES CONSTANCE E. COOK AND ALICE H. COOK AWARD



DR. CYNTHIA LEIFER STANDS WITH AVERY AUGUST, DEPARTMENT CHAIR OF MICROBIOLOGY AND IMMUNOLOGY; AND HUNTER RAWLINGS, FORMER CORNELL UNIVERSITY PRESIDENT.

“THE PERCEPTION THAT WORK AND LIFE ARE NOT POSSIBLE TO BALANCE, ESPECIALLY IN VETERINARY ACADEMIA, SCARES AWAY A LOT OF TALENTED WOMEN. WE NEED MORE DYNAMIC AND SUPPORTIVE ROLE MODELS FOR THESE WOMEN, AND WE NEED POLICIES THAT ENABLE US TO ATTRACT THE BEST RESEARCHERS AND CLINICIANS TO ACADEMIC RESEARCH AND MEDICINE, AND ESPECIALLY TO CORNELL.”

—DR. CYNTHIA LEIFER

Dr. Cynthia Leifer, associate professor of immunology, was one of several honored with the Constance E. Cook and Alice H. Cook Award on March 9th. Cook Awards honor Cornell students, faculty and staff members for their commitment to women’s issues and for improving the climate for women at Cornell. The Cook Award Committee and the University Diversity Council select winners from nominations made by members of the Cornell community. “I am so honored that the service I do for women at the College was recognized for making such a difference,” says Leifer. “To me an award is not the end result—I plan to continue my efforts to improve the climate for women and promote their success here at the College.”

Leifer has worked on and chaired the College’s Committee for the Status of Faculty Women. This important

committee assess the climate for women at the College and develops initiatives to support their professional development, promotion, and success. “The committee was instrumental in establishing formal mentoring for early career faculty, and sponsors workshops on topics such as negotiation, work-life balance, and promoting your research in the media,” says Leifer. “We also collect data on numbers of women faculty and their promotion. We use these data to raise awareness and make the case that we still have a long way to go to reach equality.”

Leifer was also awarded a grant from the President’s Council for Cornell Women entitled “Empowering Women at Cornell’s College of Veterinary Medicine,” in collaboration with Associate Dean for Faculty Affairs Dr. Susie Fubini. “This grant will allow us to bring high-profile speakers to the College and open our

programs up to all women,” Leifer says. While grants such as these represent progress, women in academia still face an uphill battle. “Even with strong and supportive partners, raising a family and rising through the faculty ranks is still a challenge,” Leifer explains. “We have come a long way at Cornell by establishing an on campus daycare and enacting automatic extensions to the tenure timeline following the birth or adoption of a child. However, we still have a long way to go. The perception that work and life are not possible to balance, especially in veterinary academia, scares away a lot of talented women. We need more dynamic and supportive role models for these women, and we need policies that enable us to attract the best researchers and clinicians to academic research and medicine, and especially to Cornell.”



DR. PAUL SOLOWAY NAMED NEXT CHAIR OF THE DEPARTMENT OF BIOMEDICAL SCIENCES

Professor Paul Soloway is the next Chair of the Department of Biomedical Sciences in the College of Veterinary Medicine, effective August 1, 2017. He received his BA from Cornell University in 1979, a PhD from Princeton in 1989, and has been an Associate and then Full Professor in the Division of Nutritional Sciences at Cornell since 2002. While at Cornell, his NIH-funded research has focused on mechanisms regulating epigenetic states, and developing single molecule approaches for epigenomic analysis. New projects, recently established, address the effects of nutrients and toxins on epigenomic states in the brain. “Paul has many ties with our community already as he has been a frequent collaborator with researchers in our College,” says Dean Lorin Warnick. “We are fortunate to have a scientist of his quality and breadth of academic experience join us as department chair.”

“I have gotten to know many vet school colleagues during my 15 years at Cornell, and they are a great group of scientists and clinicians—smart, creative, and collegial,” says Soloway. “The chance to join and work with them more closely is an amazing privilege that expands upon the terrific opportunities I’ve enjoyed at Cornell already.” He adds he was “both humbled and honored” to receive the appointment. “My first priorities are to do no harm, and to lessen any challenges that might distract the Biomedical Sciences faculty from doing what they do best in the lab, clinic and classroom. Biomedical Sciences will be a logical participant in university-wide initiatives, including one to expand genome biology at Cornell. Another goal will be finding outstanding recruits for that initiative, whose interests align with department and university priority areas.”

The occasion also calls for recognition and thanks to Dr. Mark Roberson, who served as chair since 2007, and will be returning to full-time faculty responsibilities and continuing his research in reproductive biology. “Mark has done an excellent job in this role and it has been a pleasure to work with him in College leadership,” says Warnick.



DR. PAUL SOLOWAY

NEW NAMED PROFESSORS FROM JULY 1, 2016–JULY 1, 2017

Lisa A. Fortier, with the Department of Clinical Sciences, was elected the **James Law Professor of Large Animal Surgery**, effective April 1, 2017.

Robert E. Oswald, with the Department of Molecular Medicine, was elected the **James Law Professor of Molecular Medicine**, effective July 1, 2017.

Brian D. Rudd, with the Department of Microbiology and Immunology, was elected the **Robert Hovey Udall Assistant Professor**, effective November 1, 2016.

Gerlinde Van de Walle, with the Baker Institute, was elected the **Harry M. Zweig Assistant Professor**, effective January 1, 2017

Steven A. Osofsky, with the Department of Population Medicine and Diagnostic Sciences, was elected the **Jay Hyman Professor of Wildlife Medicine and Health Policy**, effective November 1, 2016.

Nita L. Irby, with the Department of Clinical Sciences, was elected the first **Ruttenberg Senior Lecturer**, effective November 1, 2016.

SCIENCE VS. SUPERBUGS: ANTIMICROBIAL RESISTANCE SYMPOSIUM UNITES EXPERTS TO TACKLE A GROWING CONCERN



SARAH NICKERSON

SYMPOSIUM ORGANIZERS, SPEAKERS, AND ATTENDEES POSE TOGETHER AT THE CORNELL BOTANICAL GARDENS.

This May, the College hosted “Antimicrobial Resistance: Research Synergies in Human and Animal Medicine,” an event spearheaded by Dean Lorin Warnick, along with Senior Associate Vice Provost for Research Andy Bass. “We thought it would be great to get everyone together to discuss this issue and build some relationships that could lead to collaboration in the future,” said Warnick.

The event united students, scientists, doctors and veterinarians—and featured presentations from the College of Veterinary Medicine and Weill Cornell Medical College faculty, as well as keynote speaker Dr. Arjun Srinivasan, associate director of Healthcare Associated Infection Prevention Programs at the Center for Disease Control and Prevention. “When it comes

to antimicrobial resistance, it’s truly an issue where we’re all into it together,” said Warnick.

College veterinary faculty members Dr. Gillian Perkins, senior lecturer of Large Animal Medicine and director of biosecurity for the Cornell University Hospital for Animals, and Daryl Nydam DVM ’97, PhD ’02, associate professor of Ambulatory and Production Medicine and director of Quality Milk Production Services, discussed current practices in monitoring and managing antimicrobial resistance in the veterinary world, while Drs. Jeongming Song and Brian VanderVen, both assistant professors of microbiology and immunology at the College, discussed ways of avoiding use of antimicrobials altogether via alternative approaches to combatting bacterial diseases.

Keynote speaker Srinivasan noted that the kind of strides made in herd treatment demonstrated by the QMPS are key in reducing the risk of antimicrobial resistance. Data show that improving antibiotic use alone can “slow development of resistance, and we might even be able to reverse it,” he said.

From cheap dairy cow diagnostics, to decoding bacteria’s defenses, the event showcased the breadth and depth of the College’s expertise and innovation, and set the stage for future conferences and collaborations in the important field of antimicrobial resistance.

**THE MIGHTINESS OF MILK:
DAIRY CENTER OF EXCELLENCE HOSTS SECOND ANNUAL SYMPOSIUM**



SPEAKERS AND ORGANIZERS POSE TOGETHER AT THE CORNELL DAIRY CENTER OF EXCELLENCE SYMPOSIUM.

The Cornell Dairy Center of Excellence held its second annual symposium titled “Dairy Nutrition for Every Age and Stage” on May 16. The event united everyone from dairy farmers to dieticians—and brought in a ‘Built with Chocolate Milk’ Ironman champion. “The last century has seen dramatic improvement in food safety, and Cornell has been front and center in a lot of those developments,” said Dean Lorin Warnick. “We have a very long legacy in dairy research, and we build on this legacy through the work of faculty across campus who address current issues such as infectious disease, antimicrobial resistance, innovation in food products and more. . . . The Dairy Center of Excellence fosters

collaboration amongst our faculty and those outside of the university to address critical needs in dairy research, education and outreach.”

A highlight of the session was Mirinda Carfrae, an Ironman triathlon world champion and ‘Built with Chocolate Milk’ athlete, who spoke about how nutrition is just as important as physical and mental strength. “When you are training 30 to 35 hours a week, recovery becomes a really important component. The better you recover from a session, the more likely you are to nail the next session,” said Carfrae. “Chocolate milk is my choice of a recovery drink. . . . it tastes good and you’re getting the nutrition you need.”



ABOVE & MIDDLE: MIRINDA CARFRAE TOURS THE TEACHING DAIRY BARN.

BOTTOM: CARFRAE AND PANELISTS SPEAK AT THE SYMPOSIUM.

ALL PHOTOS THIS PAGE: SARAH NICKERSON

IMPROVING THE ODDS OF EQUINE ANESTHESIA RECOVERY

Horses face a much higher risk of dying when undergoing general anesthesia compared to humans and other domestic animals, with fatality rates reported a little shy of one percent. Many of those fatalities are attributable to orthopedic injuries that occur in the recovery room, presenting a risk that both horse owners and veterinarians are aware of, yet have little control over.

Currently, there is no scientifically-based best practice for equine anesthesia recovery techniques. Most equine practitioners have established their own specific protocols to minimize complications—primarily with the goal of minimizing a horse’s startled, uncoordinated movements, which can lead to bone fractures. These methods might include rope-and-pulley systems, water-assisted recoveries, or no assistance at all. Yet, it’s still unclear if these recovery methods prevent—or even cause—these injuries.

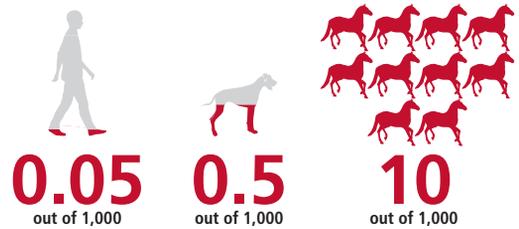
Thanks to the generous support from from longtime friend and donor of the College Richard Schechter, researchers

have started a study to identify the elements that are likely to ensure safe recovery from anesthesia, and to provide the evidence to justify changes in established practice, should they be necessary. “I had known for a long time that there was an issue with anesthesia with horses, but I didn’t realize its magnitude until I lost a beloved horse from that, and began looking into the problem,” says Schechter. “I felt it was time to do something—and, as one of the best veterinary facilities in the world, Cornell is uniquely qualified to work on this.”

Phase one of the study is well underway. It comprises surveying equine practitioners about their methods, views, and outcomes around anesthesia recovery. The survey garnered a 43 percent response rate, with 380 respondents—half of which said they are willing to participate in future studies examining the topic. “This indicates

BY THE NUMBERS

Horses are over 200 times more prone to anesthetic fatality during anesthesia than humans, and 20 times more so than dogs.



there’s a lot of interest with these clinicians to address this issue,” says Dr. Julia Miller ’12, a postdoctoral fellow working on the project.

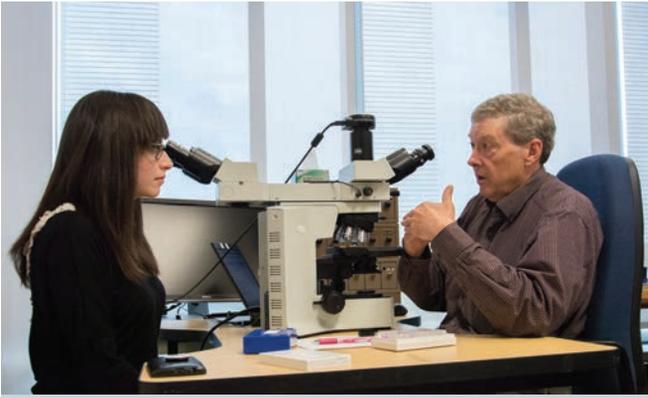
Preliminary findings from the survey revealed that the majority of equine practices assist patients during the recovery process, but thus far, no patterns exist in terms of whether assisted or unassisted recoveries result in better or worse outcomes.

This phase also entails filming and analyzing videos of equine anesthesia recoveries done at the Cornell University Hospital for Animals, with a target of 300 to 500 recoveries analyzed. “We’re going to see if there’s a pattern after watching all these videos to determine if horses that have unacceptable recoveries always fall a certain way,” Miller explains. “If we do determine that, the end goal is to build a fall-prevention system.”

Building and testing that system would comprise phase two of the project, which will involve collaborations with Cornell biomechanical engineer Andy Ruina. “The study has great potential that will require additional funding, particularly as the prototype is developed,” says Miller. “Faculty are seeking additional support through research grant applications, but private funding is also encouraged from individuals who are concerned about the welfare of the horse.”



RICHARD SCHECHTER (RIGHT), STANDS WITH RIDER JENNIFER MAGEE AND HORSE, CHURCHILL’S ACE AT THE WELLINGTON WINTER EQUESTRIAN FESTIVAL.



COLLEGE HOSTS SEMINAR ON VETERINARY FORENSIC PATHOLOGY

This summer, District Attorneys (DAs) and Humane Society administrators will visit the College for a half-day seminar on veterinary forensic pathology. The program will be hosted by the Animal Health Diagnostic Center (AHDC) and orchestrated by Dr. Sean McDonough, associate professor of veterinary pathology.

“There’s a growing realization around the connection between violence against animals and violence against people,” says McDonough, explaining that animal abuse is much more likely to be prosecuted now that the crime is a felony in some cases. “DAs are interested in pursuing prosecution of these people, but they have relatively less experience in how to approach these animal cases compared to human ones.”

Thus, McDonough organized the seminar, which is targeted at key New York State DAs and Humane Society members to educate them on available resources at the College and AHDC. “We want them to have appreciation of the expertise our faculty and staff can bring to these cases,” he says, noting that trained necropsy and histological skills can be instrumental in proving abuse cases.

McDonough also will educate DAs on what the AHDC scientists can and can’t do. “There can be the CSI-effect, where people expect a detailed report in a few days that leaves no question as to what happened, and that’s just not possible sometimes,” he says.

Another goal of the program is to strengthen forensic pathology in the state of New York. Currently there is no formal training for this specialty, and McDonough would like to develop a program analogous to that of a human medical examiner specialty. “When I started this profession thirty years ago, I didn’t know much about it, and I made mistakes,” he says. “We’d like to provide our expertise so other people don’t have to make those same mistakes, and ensure the next generation of veterinary forensic pathologists in New York State are of the highest quality.”

STUDENT-RUN BLOG MAKES ITS DEBUT

This spring marked the launch of Science@CornellVet, a blog run and written by Cornell veterinary and graduate students and trainees. Published weekly, the blog highlights the daily scientific and clinical work that takes place at the College and offers insights on the role of science in today’s modern culture.

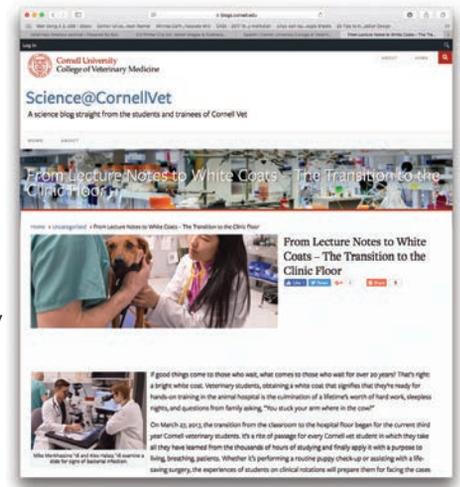
The blog’s board of editors comprises students and trainees from across the College who work with faculty and staff mentors to write stories that can communicate science and clinical topics to a wide audience. “Science communication is so important, now more than ever before,” says Dr. Cynthia Leifer, associate professor of microbiology and immunology and faculty mentor on the blog’s board of editors. “I was fortunate to have formal training and mentorship in writing for a non-scientific audience when I was a Cornell

Public Voices Fellow. I am so excited to now pay it forward and work one-on-one with trainees to provide them with the tools and feedback to become better science communicators themselves.”

Blog posts have touched on a wide range of topics—from the March for Science in Washington D.C., to repurposing old drugs to treat brain cancer—and have provided valuable experience for the students involved. “Using the blog to talk about the research we do in the department is not only a great way for me to improve my science communication skills, but is also a great excuse for me to talk to people whose work I like and admire,” says Luisa Torres, postdoctoral researcher in Microbiology & Immunology. “It’s satisfying that my work and the work of others is reaching a wider audience because I’m distilling the message for lay people and explaining why it is relevant to them.”

Explore the blog online:

blogs.cornell.edu/vetblogs



NEW FACES, NEW VOICES

INCOMING STUDENT PROFILES



“I AM ESPECIALLY
LOOKING FORWARD
TO THE PROBLEM-
BASED LEARNING
CURRICULUM”

—ZOE DANIELS



“CORNELL’S
VETERINARY
PROGRAM HAS
A FANTASTIC
REPUTATION ACROSS
THE VETERINARY
SCIENCES AND WAS
A COMMUNITY I
WANTED TO BE A
PART OF.”

—KWAMINA OTSEIDU



Each summer, new students arrive to the College with a diversity of backgrounds and an array of opportunities ahead of them. We'd like to welcome the incoming classes as they begin their journey as Cornellians, and give you a brief snapshot of some of the new faces who'll be joining us as veterinary students this coming semester.



BEN FLAKOLL

Age: 23

Hometown: Managua, Nicaragua

What school/occupation are you coming from?

Neuroscience at Brown University, Pacific Coast Horseshoeing School, and an apprenticeship with a farrier in Oregon

Why did you decide to pursue veterinary medicine?

I love all animals, but I have a special relationship with horses. I was riding before I could even walk, and I spent most of my childhood and adolescence on the back of a horse. I lived to ride, first in the countryside and later training in jumping and classical dressage. Unfortunately, most horses in my country are primarily beasts of burden, working under harsh and unforgiving conditions, mistreated, and poorly cared for. . . . This mixture of loving animals and my horror at their mistreatment led to my lifelong commitment to animal welfare, which has expressed itself in my volunteer work with the Humane Society's Rural Area Veterinary Services and Sustainable Vets International, my undergraduate studies and research, and my desire to become a veterinarian.

Why did you decide to attend Cornell's veterinary program?

Cornell has an incredible reputation, a great equine program, and I was really interested in its problem-based learning model. . . . The minute I stepped onto the Cornell campus, I knew I was in the right place. I felt a strong connection to the environment and people, met some amazing faculty members, had a fantastic experience in the mock tutorial session, and also discovered the many ways Cornell can support my desire to improve animal welfare globally.

What is your career goal after veterinary school?

My "career goal" is to split my time as a veterinarian between the United States and Nicaragua, with a focus on equine welfare.

What's something people may not know about or makes you unique?

I'm a first degree black belt in Taekwondo, and speak three languages.



ZOE DANIELS

Age: 22

Hometown: Long Island, N.Y.

What school/occupation are you coming from?

University of Pennsylvania, BA in biology, minor in biological basis of behavior

Why did you decide to pursue veterinary medicine?

When I was eight, my two-year-old dachshund, Trixie . . . had to have her leg amputated due to sepsis at the Animal Medical Center in Manhattan—which is where my interest in veterinary medicine began. I've been at the Animal Medical Center for the past five years, volunteering and working as a veterinary assistant . . . That once-idealistic eight-year-old girl now has an immense appreciation for the responsibilities, challenges, and humanity found in veterinary medicine, and I am eager to take on this next challenge.

Why did you decide to attend Cornell's veterinary program?

I am especially looking forward to the problem-based learning curriculum. I have come to realize that this nuanced education structure is what makes the alumni of Cornell's veterinary program distinct from the alumni of other schools. . . .

What is your career goal after veterinary school?

I would like to work in a small animal veterinary hospital as a specialized staff doctor with certification in traditional Chinese veterinary medicine. I am interested in pain management, and I believe that traditional Chinese veterinary medicine would give me a deeper understanding and a more holistic approach to this.

What's something people may not know about or makes you unique?

I am a classically-trained soprano vocalist.

“THE MINUTE I STEPPED ONTO THE CORNELL CAMPUS, I KNEW I WAS IN THE RIGHT PLACE.”

—BEN FLAKOLL

“CHOOSING A VETERINARY PROGRAM CAME DOWN TO ONE QUESTION: WHO IS MOST DEDICATED TO NURTURING PIONEERS. UPON VISITING NUMEROUS PROGRAMS, IT BECAME IMMEDIATELY APPARENT THAT CORNELL WAS THE PLACE FOR ME.” —ANDREW BASHI



CORENE BRUHNS

Age: 26

Hometown: Paramus, N.J.

What school/occupation are you coming from?

A BA in Biology with a minor in chemistry at Rutgers University, but prior to that I was a competitive ice dancer. I was privileged to represent my mother’s native country (Mexico) at the World Figure Skating Championships twice before I retired from skating and began my academic career.

Why did you decide to pursue veterinary medicine?

Caring for animals has been a priority for me throughout my life and veterinary medicine was always a career I thought I might want to pursue after skating. While exploring my options during college I fell in love with the physical sciences but also became involved with volunteering at animal rescue organizations. This also led to an interest in dog obedience, agility, and behavioral training. When I started working as an assistant at an animal hospital, veterinary medicine felt like the right fit and was a natural progression and blend of my interests in animal care and science.

Why did you decide to attend Cornell’s veterinary program?

Cornell initially stood out to me because of the problem-based learning environment and opportunity to be hands-on from the first year . . . The Cornell community is also incredibly welcoming and supportive.

What is your career goal after veterinary school?

To pursue a residency in either canine sports medicine and rehabilitation or behavior, but I’ve also found myself increasingly drawn to clinical pathology lately.

What’s something people may not know about or makes you unique?

When I’m not at work or hanging out with my two dogs, you can usually find me either researching and trying out new low stress/behaviorally sensitive restraint techniques for cats and dogs, or sewing pet bandanas for my friends and patients.

“CARING FOR ANIMALS HAS BEEN A PRIORITY FOR ME THROUGHOUT MY LIFE AND VETERINARY MEDICINE WAS ALWAYS A CAREER I THOUGHT I MIGHT WANT TO PURSUE AFTER SKATING.” —CORENE BRUHNS



ANDREW BASHI

Age: 29

Hometown: Chicago, Ill. and West Bloomfield, Mich.

What school/occupation are you coming from?

I am a lawyer that started a criminal defense law practice after law school. I graduated from Loyola University Chicago School of Law in 2012 with my Juris Doctor and certificate in public interest law.

Why did you decide to pursue veterinary medicine?

The realization that I wanted to pursue a career in veterinary medicine came a bit later in the game than most. After practicing law for a while I realized working in an adversarial system was not for me. After following my wife’s advice to take some time off and to explore things I’d always wanted to do, I learned how much I enjoy working with my hands. At the same time, I started volunteering with a local wildlife rehabilitation organization where I handled education raptors and triaged a wide variety of injured birds and mammals. While I absolutely love working with wildlife, I am really looking forward to exploring the incredible bounty of career options available to veterinarians.

Why did you decide to attend Cornell’s veterinary program?

Choosing a veterinary program came down to one question: Who is most dedicated to nurturing pioneers. Upon visiting numerous programs, it became immediately apparent that Cornell was the place for me. I was particularly drawn to problem-based learning.

What is your career goal after veterinary school?

The technical nature of surgery has definitely drawn me towards it, however I am also very passionate about wildlife conservation. My life has taught me to be patient and open to opportunities that come to me. I am looking forward to exploring the many paths open to Cornell students and graduates.

What’s something people may not know about or makes you unique?

I really love fixing things, from my cars to random electronics and things around the house. During financial droughts I made a small fortune fixing broken stuff I found in alleys and selling them on eBay! I’ve also built several pieces of furniture.



KWAMINA OTSEIDU

Age: 21

Hometown: Getzville, N.Y.

What school/occupation are you coming from?

Michigan State University

Why did you decide to pursue veterinary medicine?

Although I have been interested in animals since I was young, my decision to pursue veterinary medicine came to me junior year of undergrad where I noticed more of my research interests were leaning toward animal health.

Why did you decide to attend Cornell's veterinary program?

Cornell's veterinary program has a fantastic reputation across the veterinary sciences and was a community I wanted to be a part of. They also have programs that deal directly with one of my main interests which is aquatic animal health.

What is your career goal after veterinary school?

I hope to go into veterinary research and work in academia researching aquatic animal health or biomechanics.

What's something people may not know about or makes you unique?

My favorite animals are the eastern newt *Notophthalmus viridescens*, and fish from the clade *polypteriformes* which are bichirs and roperfish.

“NOT ONLY IS CORNELL KNOWN FOR THEIR VETERINARY PROGRAM AND EXCELLENCE IN SCIENTIFIC RESEARCH, THEY ARE ALSO VERY COLLABORATIVE. WHEN I VISITED CORNELL, I KNEW THAT THEY WOULD ALLOW ME TO EXPLORE ALL OF MY INTERESTS AND WOULD PUSH ME TO THINK OUTSIDE OF THE BOX.”

—AMANDA LOEHR



AMANDA LOEHR

Age: 22

Hometown: Lebanon, Pa.

What school/occupation are you coming from?

Gettysburg College

Why did you decide to pursue veterinary medicine?

My interest in veterinary medicine actually only developed after I started working with a veterinarian. After being exposed to the profession, I realized that veterinary medicine is very dynamic. In contrast to human doctors, veterinarians don't just see one species, and they don't have to be just an ophthalmologist, cardiologist or radiologist—they can be all those things and more! Veterinary medicine is also very investigative—animals can't tell you what their symptoms are, so you must carefully observe, interpret and test in order to reach a diagnosis.

Why did you decide to attend Cornell's veterinary program?

Being a DVM/PhD combined-degree student, I was looking for a school where I could get a great veterinary education and top-notch research training. Not only is Cornell known for their veterinary program and excellence in scientific research, they are also very collaborative. When I visited Cornell, I knew that they would allow me to explore all of my interests and would push me to think outside of the box.

What is your career goal after veterinary school?

I hope to be able to use my veterinary training in a research-focused career. I am primarily interested in comparative oncology—using naturally occurring cancers in pets to learn more about cancer in general. I would love to work in an academic setting, like Cornell, where I could teach and use the resources and patient population of the hospital to do translational research that will ultimately contribute to animal and human health.

What's something people may not know about or makes you unique?

I am very passionate about FOOD! I love to cook and try new things. The only thing that makes me happier than pizza is adorable baby animals.

LEARNING

DVM PROGRAM



66

New York State residents



17

GRADUATED FROM CORNELL



MEDIAN AGE

21

18%
male



82%
female



UNDERREPRESENTED MINORITY STUDENTS

23

3.7

MEDIAN GPA

160 (84%)

MEDIAN GRE VERBAL

159 (73%)

MEDIAN GRE QUANTITATIVE



113

Bachelor's Degrees



3

Master's Degrees



1

Juris Doctorate



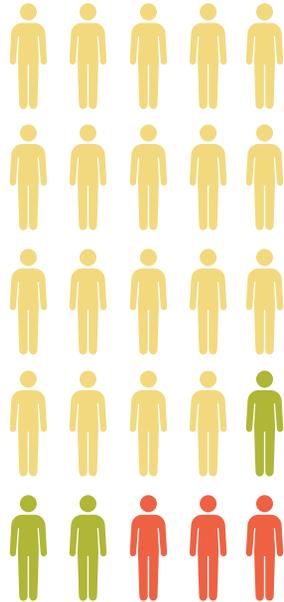
1

PhD



Biological & Biomedical Sciences (BBS) PhD Program

25
NEW STUDENTS



19

PhD students



3

Combined DVM-Phd students



3

DVM seeking PhDs

9 =

UNDERREPRESENTED MINORITY STUDENTS

36%

OF NEW STUDENTS

NEW PROGRAM

16
STUDENTS

Master of Public Health Program

5 Students from Upstate NY
5 International students
50% Underrepresented minority students

3.5
Average GPA



33%

First Generation College Student

100

Total years of work experience among them



MALE 44%



WOMEN 56%

NEW PROGRAM

7
STUDENTS

Master of Professional Studies-Veterinary Parasitology

30
Average age



PRIOR UNIVERSITIES:

Cornell University
Lockhaven University
SUNY Oneonta
University of Saint Joseph
The Ohio State University
University of Hartford
University of Wisconsin

3.50
Average GPA

100%
Female

14%

Underrepresented minority

SCIENTIFIC DISCOVERY FORMS THE FOUNDATION OF THE COLLEGE'S EXCELLENCE IN VETERINARY MEDICINE. ACROSS DISCIPLINES AND DEPARTMENTS, CVM SCIENTISTS CONTINUE TO LEAD IN THEIR FIELDS WITH FINDINGS THAT EXPAND UNDERSTANDING AND IMPACT THE REAL WORLD.

RESEARCH GETS REAL

CVM SCIENTISTS STAY AT THE CUTTING EDGE



CLINICAL SCIENCES

A MOLECULAR BRACE FOR SPRAINS

by Patricia Waldron

Rest, ice, compress and elevate is the advice that most people get after a sprained ankle from tripping on stairs or falling on the soccer field. These measures help alleviate the pain, but no clinical data backs up this advice as the best treatment for healing or long-term joint health.

Dr. Lisa Fortier, a professor of large animal surgery just recently awarded the James Law professorship, is looking for new treatments for sprains. She is partnering with Dr. Hazel Szeto of Weill Cornell Medicine to test a peptide called SS-31 in horses with mild to severe ankle sprains. The peptide stabilizes mitochondria in the damaged tissue, acting like a molecular brace for the sprain, and preventing further damage, which can lead to the irreversible process of arthritis. Fortier's work will yield evidence-based therapies for treating sprains, with the ultimate goal of averting arthritis in horses, dogs and humans.

A SERENDIPITIOUS DISCOVERY

While sprains are painful and inconvenient, a more serious health problem in humans and horses is the sequela of post-traumatic osteoarthritis. Trauma from a fall, vehicle accident, or military injury can trigger this type of arthritis, which develops months, years or even decades after the initial damage.

Injury to a joint also damages the mitochondria in cartilage tissue. These organelles, which normally are packed full of waves of internal membranes, become disorganized and leaky. Without a source of energy from the mitochondria, cells die and the cartilage degrades. Developing drugs that target the cells in the cartilage, however has been a challenge for researchers. Szeto and colleagues serendipitously discovered SS-31, a small, water-soluble peptide with a unique charge density that allows it to penetrate the tissue and cross the cell membrane. It enters the mitochondria where it binds to cardiolipin, a phospholipid that makes up part of the inner membrane, thus stabilizing the membrane and restoring power to the cell.

ONE PEPTIDE, MANY POSSIBILITIES

Several phase II clinical trials of SS-31 are underway in humans for diseases where mitochondrial dysfunction plays a role, with phase III trials in the planning stages. Szeto and colleagues are investigating the peptide's effectiveness at treating acute myocardial infarction, heart failure, renal disease, and age-related macular degeneration. SS-31 appears to have no off-target effects and can be taken in liquid form, so potentially it could be sold as an over-the-counter medication.

Now, Fortier and Dr. Michelle Delco, an assistant research professor and equine surgeon in her lab, are testing a single dose of the peptide in six horses that have experienced trauma to the cartilage of the hock joint, as a model for human ankle sprains. It's a proof-of-concept experiment to see if they can stabilize the tissue and prevent arthritis. "We're trying to study the early disease process, long before clinical signs associated with arthritis such as bone spurs and lameness appear," says Fortier. It's the very early stages of trauma that we and others are targeting for therapy and prevention."

The resulting treatments can be applied to human ankles, horses with stifle injuries, and dogs with cruciate ligament trauma. "That's the cool thing about our work," says Fortier. "We identify a problem in the clinic and we can take it to the laboratory and design studies to simultaneously help humans and animals."

NOTEWORTHY WORK

Next, Fortier and her colleagues plan to develop better diagnostic procedures, using MRI and CT techniques, to detect the earliest signs of degeneration. Existing clinical methods are not sensitive enough to pick up changes in cellular metabolism in the cartilage to study post-traumatic arthritis.

These projects, and Fortier's other innovative research, recently earned her the title of the James Law Professor of Equine Surgery. "To me, it's a huge honor because you're selected internally by your peers," says Fortier. "To be recognized for the work my group has done is really humbling."

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“THAT’S THE COOL THING ABOUT OUR WORK. WE IDENTIFY A PROBLEM IN THE CLINIC AND WE CAN TAKE IT TO THE LABORATORY AND DESIGN STUDIES TO SIMULTANEOUSLY HELP HUMANS AND ANIMALS.”

—DR. LISA FORTIER



DR. LISA FORTIER

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ABOVE: DR. LISA FORTIER CONDUCTS ORTHOPEDIC SURGERY ON AN EQUINE PATIENT. LEFT: FORTIER AT WORK IN HER LABORATORY WITH DR. MICHELLE DELCO AND BRIDGETTE NIXON.

“THE TRADITIONAL VIEWPOINT ON CANCER RESEARCH IS CURING CANCER, BUT OUR FOCUS IS UNDERSTANDING HOW CANCER STARTS. WHEN YOU GET CANCER, IT’S HARD TO TREAT, SO THE BEST IDEA IS TO PREVENT IT FROM OCCURRING IN THE FIRST PLACE.”

—DR. ANDREW WHITE

DR. ANDREW WHITE

ROOTING OUT SKIN CANCER'S ORIGINS

By Patricia Waldron

Scientists are exploring stem cells as potential treatments for health issues ranging from stroke to autism to heart failure. But Dr. Andrew White, assistant professor of Biomedical Sciences, investigates stem cells' destructive side, as originators of cancer.

A recent addition to the Cornell faculty, White has established a research program that uses mouse models to tease apart the mutations and environmental triggers that turn adult stem cells into melanomas and squamous cell carcinomas. Drawing on his previous experience in developmental biology, he hopes to gain a better understanding of how tumors originate and to develop highly targeted, preventive therapies.

"The traditional viewpoint on cancer research is curing cancer, but our focus is understanding how cancer starts," says White. "When you get cancer, it's hard to treat, so the best idea is to prevent it from occurring in the first place."

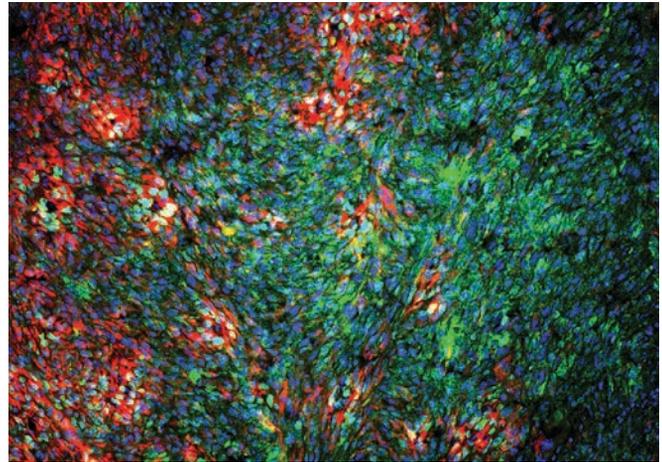
CELLS OF ORIGIN

Adult stem cells occur in tissues throughout the body, where they multiply to replace dying cells and to repair damage. While other cells die and are sloughed away, adult stem cells persist, allowing them to accumulate mutations that can lead to cancer. Some research even suggests that a subset of stem cells within a tumor can cause relapse since these slow-growing cells survive chemotherapy and radiation treatments that target rapidly dividing cells.

Using genetically engineered mice, White's lab has developed a way to model skin cells containing mutations that lead to squamous cell carcinoma and melanomas, such as p53, Ras, Braf and Pten. The work builds on White's postdoctoral research at the University of California, Los Angeles with William Lowry, professor of Molecular, Cell and Developmental Biology, where he worked with hair follicles to show that adult stem cells act as cancer cells of origin when they have the right mutations. Their non-stem cell progeny, however, which have the same mutations, do not. Additionally, he found that tumors did not form during stem cell quiescence, but only when the follicle entered an active phase of hair growth. "I was quite interested and excited by this result," says White. "Since one could imagine that by understanding how a cell holds back cancer initiation through the natural process of stem cell quiescence, we could then find a way to pharmacologically reactivate these blocking signals in an early stage cancer to prevent progression, or even prevent a cancer from starting in the first place."

DOWN THE WRONG PATH

White's more recent studies have shown that inflammatory stimuli can activate formerly quiescent adult stem cells to



IMMUNOFLUORESCENCE IMAGING OF SQUAMOUS CELL CARCINOMA OF THE SKIN.

initiate a skin tumor. In other tissues, "it could be a lung infection or inflammation of the bowel—something that causes the stem cells that have the tumor mutations to go down the path to proliferate and divide and form an actual tumor."

In his most recent work, White is venturing into the study of melanoma, and the role of melanocyte stem cells. These cells are located within the hair follicle in the skin and their cell division is linked to the hair growth cycle. White received funding for this work from the Department of Defense. Many veterans returning from Afghanistan and Iraq have high rates of UV exposure, making them an at-risk population for skin cancer. He envisions that preventive compounds could be included in sunscreen or cosmetics that would block stem cells' progression to tumor formation.

A BIG PROBLEM TO SOLVE

White points out that just as with traditional cancer treatments, attempts to block developmental pathways will likely have side effects. One class of proteins called oncofetal antigens typically function only during fetal development and in certain types of cancer. He suspects that interfering with these pathways should cause fewer side effects.

White started his career in developmental biology because he was fascinated by the three-dimensional nature of tissue growth and cell movement. After finishing his doctorate, however, he realized that cancer biology offered more opportunities to work on clinically relevant problems, while still investigating basic biological mechanisms of disease.

"Developmental biology is trying to understand how things happen in nature, whereas cancer biology is a problem to solve," says White. "It's a shift from being excited about the natural complexity of the world, to applying that understanding of complexity to solving a problem."

“AFTER SOME INVESTIGATION WE DID A TEST. WE FOUND THAT ALL THE TISSUES TAKEN STRAIGHT FROM THE BODY WERE SIMILAR TO ONE ANOTHER AND EVERYTHING GROWN IN A DISH WAS SIMILAR TO EVERYTHING GROWN IN A DISH.”

—DR. CHARLES DANKO

DR. CHARLES DANKO



IN VIVO VERITAS:

DANKO LAB DISCOVERY PINPOINTS IMPORTANCE OF CANCER CELLS' HOME TURF

By Merry Buckley

To learn about cancer and search for new treatments, scientists need to study tumors up close, so they often cultivate tumor cells from animal and human patients in the lab. However, new work by Dr. Charles Danko of the Baker Institute for Animal Health shows that this approach may well lead scientists on a wild goose chase.

More than one and a half million new cases of cancer are diagnosed in humans every year in the U.S., and dogs suffer cancer at similar rates. There's less information available about cancer rates in cats, but it's suspected they endure cancer rates that are similar to humans as well. To find treatments for these diverse conditions, scientists need to be able to manipulate cancerous cells and subject them to different conditions, and they need a lot of cells to work with. However, studying tumors in the sites where they grow inside humans, dogs, and cats with cancer is difficult (and dangerous for the patient), so scientists grow them in the lab, sort of like farmers, planting tumor cells in nourishing medium to grow and multiply, then harvesting them for study.

HIDE-AND-CHRO-SEQ

To understand the adaptations cancer cells use to achieve their out-of-control growth, Danko and his students and colleagues developed a new technique called ChRO-seq (pronounced CROW-seek) to study cells from a rare form of brain tumor known as glioblastoma. ChRO-seq tracks a certain enzyme inside these cells called RNA polymerase, identifying where the enzyme is hard at work reading and translating the information in the genome. By identifying the location of these hardworking enzymes, Danko and his team can tell which genes are being transcribed into RNA and which parts of the genome act as "enhancers," encouraging RNA polymerase to ramp up the activity of certain genes. The team began their study with cells from a glioblastoma tumor that had been stored in the freezer for more than 30 years. Glioblastoma is an aggressive form of brain cancer common to humans and animals.

Danko and his team compared the ChRO-seq results from glioblastoma cells taken straight from a tumor (called "primary" brain tumor) with glioblastoma cells that had been cultivated in the lab, and with normal healthy cells. They expected to find that glioblastoma cells—no matter where they came from—would share many features in common with each other. It surprised them to find, instead, that the cells in the primary glioblastoma tumor were using a similar set of genes and enhancers as the normal tissue.

"There was no comparison—primary brain tumor was much closer to the normal brain cells," says Danko. At first, he says, he couldn't explain the results.

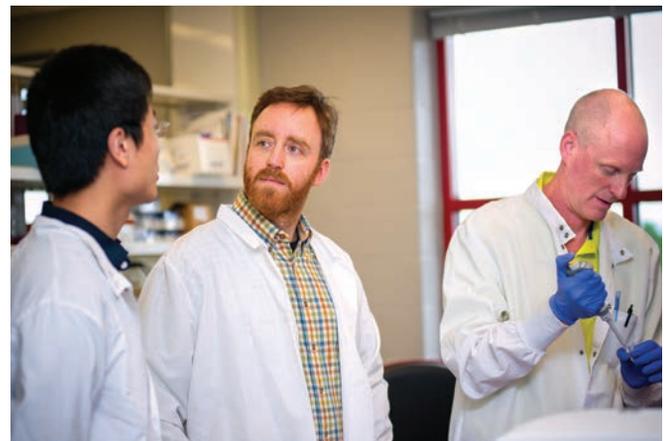
"After some investigation we did a test. We found that all the tissues taken straight from the body were similar to one another and everything grown in a dish was similar to everything grown in a dish," says Danko.

MIGHTY MOUSE (MODELS) TO THE RESCUE

At first blush, the idea that cells grown in the lab aren't good representatives for cancer in the body would appear to be terrible news for cancer research. After all, many studies carried out in recent decades have relied on cells grown in the laboratory to study cancer cell behavior and identify new treatments.

However, Danko says there's a ray of hope: tumors from humans, dogs, cats, and other animals can be transplanted and grown in mouse models, an approach that allows scientists greater flexibility in studying the behavior of cancer cells and their susceptibility to treatment. Danko and his team studied several glioblastoma tumors grown in a mouse, and these too looked a lot like normal brain tissue.

"The National Cancer Institute is encouraging scientists to move in this direction" to better represent the way tumor cells behave inside the body, where it counts, says Danko.



DANKO IN THE LAB WITH GRADUATE FELLOW TINYIN CHU AND LABORATORY MANAGER ED RICE.

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MOLECULAR MEDICINE

STRESS TESTS:

EXPLORING HOW CELLS COPE WITH OXIDATIVE STRESS

By Patricia Waldron

Each year, people in the U.S. spend billions of dollars on antioxidants purported to protect cells from dangerous free radicals and prevent all manner of diseases. A growing body of research, however, suggests that healthy cells remove free radicals just fine, without supplements, green tea or superfood smoothies. Dr. Carolyn Sevier, assistant professor of Molecular Medicine, investigates the antioxidant pathways that cells use to detect and respond to free radicals and other high-energy forms of oxygen, called reactive oxygen species (ROS). Her work has implications for the numerous diseases and disorders where these pathways go awry, including diabetes, atherosclerosis and Alzheimer's disease. Ultimately, Sevier hopes that her research into these fundamental mechanisms will lead to new therapies that alleviate ROS damage in humans and animals. "Your cells cope with ROS on a daily basis just fine due to innate coping mechanisms. The trick is, you can only identify these pathways when they fail and things go really wrong," says Sevier. "So the question to ask is, why does it work just fine? Based on the limits of what we know, it should be a mess."

STRESSED OUT CELLS

ROS form constantly as a byproduct of normal cellular functions. In diseases, ranging from heart disease to cancer, affected cells have greater ROS levels and fewer antioxidant defenses, which lead to cellular damage. Traditionally, scientists have thought that the primary source of ROS is the mitochondria, the powerhouse of the cell that produces its energy.

Sevier has carved out a research niche in a novel and previously overlooked source of ROS, the endoplasmic reticulum (ER). The ER is a network of flattened sacs where proteins become assembled and folded into their final shape. One way to stabilize proteins is disulfide bonds, which connect sulfur atoms from two different amino acids to make a bridge. Sevier knew from her postdoctorate work that each new disulfide bond generates a molecule of destructive hydrogen peroxide, which, cumulatively, represents a huge amount of ROS in the cell.

"It's not a trivial amount," Sevier says. "Insulin has three disulfide bonds. When the body makes insulin, that could be up to three million molecules of ROS per cell per minute. And that's just one protein." ROS can interfere with protein folding, resulting in messy, disorganized aggregates. Cells have mechanisms to remove ROS, but if the level gets out of hand, they need a way to detect it and give the signal to halt protein production until conditions improve.

In recent work, Sevier has used yeast as a model organism to identify an unexpected sensor of ROS within the ER, an enzyme called BiP, which normally acts as a molecular chaperone to facilitate protein folding. Sevier discovered that BiP undergoes a modification when ROS levels rise, and shifts from folding proteins to just holding them. This reaction has two benefits: it conserves energy when the environment for protein folding is not ideal and protects the polypeptides from becoming tangled. When ROS levels go back down, BiP reverts to normal and gets back to work as a chaperone. She also showed that yeast cells with an altered version of BiP that doesn't act as a sensor cannot survive in conditions with high ROS.

A molecular ROS sensor switched on during stress is useless, however, if the cell can't switch it back off again when stress goes away, so Sevier's group began looking for the protein that removes the modification from BiP. Using genetic screens, they identified a strain with a BiP mutation that could no longer interact with a protein called Sil1. Scientists have shown that Sil1 supplies BiP with energy, in the form of ATP, to assist in protein folding. Sevier's group showed that Sil1 can also reactivate BiP once the ROS levels subside by removing the modification.

NEW DIRECTIONS FOR DISEASE THERAPIES

The discovery of Sil1's role in ROS signaling in yeast may have important applications for human health. A rare disorder called Marinesco-Sjögren syndrome (MSS) frequently stems from mutations in the Sil1 gene. The disorder starts in early childhood, causing muscle weakness, problems with mobility, cataracts and other eye problems. Scientists have thought that misfolded proteins caused these symptoms but Sevier suspects that, more accurately, these patients may have difficulty detecting and responding to high ROS levels.

Now, Sevier's group is interested in finding out if the Sil1 protein serves the same role in human cells as in yeast. Her group is now actively investigating the activity of human Sil1. If the human version serves the same signaling role, perhaps treatments that artificially boost BiP's activity may be a future therapeutic strategy for patients with MSS.

After discovering this chaperone system in the ER, Sevier decided to branch out into the cytoplasm, where her student discovered a similar pathway. The work is still in the early stages, but they plan to characterize this new pathway, which involves a co-chaperone called Fes1, through an award from Cornell's Schwartz Research Fund for Women in Life Sciences.

“WE’RE GOING AFTER THIS FUNDAMENTAL, BASIC PROBLEM, AND JUST BY ANSWERING IT, WE HAVE THE POTENTIAL FOR UNDERSTANDING THE MISSING LINK IN SO MANY DISEASES.”

—DR. CAROLYN SEVIER

DR. CAROLYN SEVIER



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“So many diseases have a protein-folding defect or ROS associated with them,” says Sevier. “If you could manipulate these systems we’re finding, they could either help you cope with the ROS or with the misfolded proteins.” For example, scientists have recently implicated Sil1 in the progression of ALS, and many other neurodegenerative diseases involve tangles of proteins that impair brain function.

Antioxidant supplements may have a role in treating disorders linked to ROS pathways, but this approach needs careful consideration, says Sevier. Antioxidants might limit ROS-induced damage, but are likely to dampen cells’ ability to sense ROS and trigger normal stress response pathways.

Sevier’s interest in basic mechanisms for coping with ROS may have a big payoff when it comes to treating a variety of health problems. “We’re going after this fundamental, basic problem,” says Sevier, “and just by answering it, we have the potential for understanding the missing link in so many diseases.”

POPULATION MEDICINE & DIAGNOSTIC SCIENCES

THE SECRET SOCIAL LIFE OF COWS:

FINDING NEW WAYS TO FIGHT ANTIMICROBIAL RESISTANCE ON THE FARM

By Elodie Gazave

Dr. Renata Ivanek, associate professor of epidemiology, is building a computer model to describe how farming practices and the social behavior of cows contributes to bacteria spread and contamination on a farm. With more than 50 parameters that range from the number of solicited or unsolicited licking to the number of trips to the water tank, this model will help epidemiologists optimize antibiotic use. Ultimately, it will also be used as an educational tool to promote sustainable farming by presenting farmers with options that achieve the same results in term of economic profit and animal health, but with less antibiotics.

To put this model together Ivanek recruited the help of two postdoctoral scholars with very different backgrounds: Dr. Rachel Jennings, a mathematician from Texas, and Dr. Wendy Beauvais, a DVM and epidemiologist from the United Kingdom. “They look at the problem from very different perspectives and together they can achieve more than can separately,” says Ivanek.

UNSOLICITED LICKS AND OTHER SURPRISES

To build the model, the team had to make a list of cow activities—from the number of time they defecate, to how much they move around or which other cow they interact with. One may think cows have a pretty simple life, but their social behavior is actually surprising complex and the model needs about 50 different parameters to describe a cow’s day. “For example, there is a difference between solicited and unsolicited licks. Also, you could think the less dominant animals would lick the more dominant ones but it’s actually the other way. They lick down the hierarchy,” says Jennings. “I could watch them for hours.”

While the team had to visit farms and observe some of these behaviors, most of the data were available from literature. “We only had to directly observe six [parameters]. Most people don’t realize how much you can learn by doing synthesis of literature,” says Jennings.

One key parameter of the model is the bacterial contamination. This parameter can be modified by the researchers to study bacterial spread from different starting points. The initial conditions can be set to no bacteria at all, or a single cow infected, or as much as thirty percent of the soil contaminated. The team currently models a pathogenic *Escherichia coli* on a cattle farm, but plan to expand the approach to other important bacteria.

RESISTING THE RESISTANCE

At the center of the project is the idea of elucidating social drivers behind antibiotic use and resistance in animal agriculture and achieving sustainability in antibiotic use. For one thing, there is a consumer demand for antibiotic-free products and some farmers may want to fulfill this market’s demand. But beyond economic considerations is the need to address the scientific challenge of bacteria that are becoming resistant to all known antibiotics. “Antibiotic resistance is one of the most important issues humanity faces now,” says Ivanek.

According to Beauvais, farmers are focused on tangible benefits, which mainly means reducing costs. Some may also want to be environment-friendly and reduce antibiotic out of personal convictions. But eventually, when farmers optimize their farm they have immediate profit in mind. The long-term effect of their decision is generally not in the equation, particularly if the effect is in terms of the often-invisible antibiotic resistance.

In reality, very little is known on the subject of social factors driving antibiotic use on farms. Of the eleven identified studies published on the subject, most are done in Europe and only one involved farmers in United States, none in New York state, and none in U.S. dairy farms. “We want to be able to use [the model] and see the big picture,” says Beauvais.

The model also provides an opportunity for education; it can show farmers how to achieve the same results with less



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“ANTIBIOTIC RESISTANCE IS ONE OF THE MOST IMPORTANT ISSUES HUMANITY FACES NOW.”

—DR. RENATA IVANEK



DR. RENATA IVANEK

DRS. RENATA IVANEK, CLAIRE ZOELLNER, WENDY BEAUVAIS, AND RACHEL JENNINGS DISCUSS A MODELING PROBLEM.

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antibiotics, while maximizing their profit and having a positive global impact. “Eventually, what we want to do is to optimize the model to create a sustainable use of antibiotics on farms,” says Ivaneck.

INTANGIBLE NUDGES

To achieve rational use of antibiotics, all three researchers agree that scientists need to understand all the “intangibles” and social issues around the topic. Intangibles are factors that are not directly modeled but affect the farmer’s decision. For example, a farmer may delay antibiotic use for treatment of mastitis on an organic farm to maintain the organic status. Another farmer may treat the mastitis at the first signs of discomfort to the cow. The behavior of either of the two farmers may also be influenced by the beliefs of their veterinarians and their friends.

The complex interplay between farmers and veterinarians was a major discovery. “It’s incredible how much they ‘nudge’ each other,” says Ivaneck, using the behavioral science sense of the word, which describes the use of positive reinforcement

and indirect suggestions that influence the decisions made by a group of individuals. On one hand, the farmers may think the veterinarian prefers one solution over another one. On the other hand, veterinarians tend to go along with farmer’s expectations in term of treatment solutions.

The question then becomes: Do you educate the farmer that antibiotics is not always necessary needed? Or do you teach veterinarians—for whom saying ‘no’ may mean losing a client—interpersonal skills and a better understanding of the farmer’s perspective? “The dilemma applies to the relationship between medical doctors and their patients too,” says Ivaneck. “Identifying sustainable antibiotic use practices and the most effective ways to encourage people to adopt them are the core goals of our research.”

While the first version of the model will be designed to be used by researchers, the team plans to develop a user-friendly platform accessible to farmers, veterinarians, public health workers and other stakeholders.

MICROBIOLOGY & IMMUNOLOGY

SEX AND THE CILIATE:

TETRAHYMENA MAY HOLD THE SECRET TO SEX AS WE KNOW IT.

By Lauren Cahoon Roberts

Dr. Ted Clark didn't usually work on sex—but curiosity got the better of him. To clarify, that's sex in *Tetrahymena thermophila*, a single-celled ciliate that has distinct mating types. Through examining this organism, Clark and colleagues in the Department of Microbiology and Immunology discovered that the proteins necessary for sexual reproduction may have originated from pathogens like dengue and Zika viruses. This finding, published in the journal *Current Biology* earlier this year, illuminates new understanding around the fundamental biology of sexual reproduction in eukaryotic and complex organisms.

CURIOSITY-DRIVEN

The finding originated from a simple request to make a protein. Clark's lab—which primarily works on host-pathogen interactions—also specializes in using *Tetrahymena* as a model organism and a practical tool for manufacturing genetically-engineered proteins. A colleague at Harvard University asked Clark if his team could manufacture a specific transmembrane protein called HAP2 in order to visualize its structure through crystallography. However, “Cells don't like to make a lot of this protein normally because it's a fusion protein,” says Clark. “They only make it when they have sex and our usual tricks to force production did not work very well.” HAP2 causes fusion between membranes—critical for the fusion of a sperm and egg cell during fertilization. For most species, only male gametes express the protein, but *Tetrahymena*, with its seven sexes or mating types, was different. “That's the reason we got interested in it,” Clark says. “We're like, ‘how does this male-gamete-specific fusion protein work in an animal that has seven mating types?’ It was a curiosity-driven study.”

COLORFUL COURTSHIP

To tease out this question, Clark's team established an assay to measure membrane fusion by tagging cells of different mating types with protein-reactive dyes of red and green. If mating was successful and cells fused, the dye would flow from one cell to the other, making the exchange of protein visible. The team also created genetically-altered *Tetrahymena* mating types that lacked the HAP2 protein and marked them with dye as well. The cells with HAP2 showed a clear exchange of dyes when mating, but those that lacked HAP2 did not. This elegant solution showed that all seven mating types of *Tetrahymena* express HAP2, and that HAP2 expression in both cells of a mating pair is in fact integral to fusion during sexual reproduction in this system.

UNCANNY RESEMBLANCE

Concurrent with the color-coded sexcapade experiments was another study to determine HAP2's three-dimensional structure. Graduate student Jennifer Pinello turned to a highly sophisticated computational method known as template-based structural homology modeling, which took the amino acid sequence of HAP2 and compared that to an extensive database of known protein structures. “She came up with some pretty dramatic evidence that this HAP2 protein looked just like the class II fusion proteins found in the dengue and Zika viruses,” says Clark.

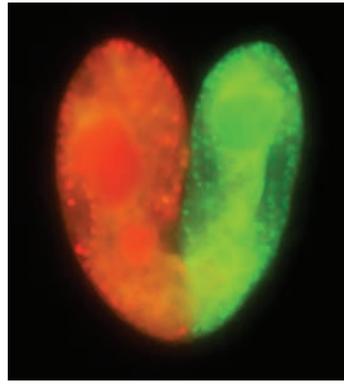
Like the viral proteins, HAP2 features a region called a fusion loop, which the viruses use to create pores in cellular membranes to enter host cells. “The protein undergoes a conformational change—it harpoons the membrane of the cell with the fusion loop and then ratchets the viral and cellular membranes together,” Clark explains.

Research groups at other institutions were also investigating HAP2, with a research team in France successfully obtaining the three-dimensional crystal structure of the protein and confirming Clark and Pinello's findings that HAP2 was almost identical to class II fusion proteins in viruses.

SEX GONE VIRAL

“The most interesting part of all of this to me is the evolutionary significance,” says Clark. He explains that the HAP2 protein exists across all branches of the tree of life, and goes back to the most ancient lineages of eukaryotes, meaning that it was probably present in the last common ancestor of all eukaryotes, and is likely necessary for sex. “So, if this protein came from a virus, this could mean that sex was made possible by a virus.” Clark goes on to paint the picture—an ancient eukaryote ancestor was infected by a virus and incorporated some of the viral DNA into its genome, which then enabled the fusion necessary for sexual reproduction as we know it today. “It's pretty fundamental stuff.”

The paper has received attention from cellular biology and virology circles. The scientific podcast “This Week in Virology” (TWIV) covered the paper, with the hosts remarking on the elegant solutions and fundamental information Clark and Pinello had uncovered. The research was also featured in an article by Dr. Robert Doms in *Cell Review*, who noted how clear the evidence was for a viral-eukaryote exchange: “it is difficult to imagine how convergent evolution could result in such a close structural match between this gamete fusion protein and



RIGHT: AN IMAGE OF MATING TETRAHYMENA, EACH DYED DIFFERENTLY TO SHOW EXCHANGE OF GENETIC MATERIAL.

© RACHEL PHILIPSON



DR. TED CLARK

class II fusion proteins in viruses,” writes Doms.

But the answer to HAP2’s form and function only begets more questions. “It’s also thought that viruses pick up genetic info from hosts—and that this has been going on since the dawn of time—so this begs the question, did this virus give this gene and protein to a very early ancestral eukaryote, and did that allow sex to evolve, or did a virus pick up this gene/protein from a host eukaryote cell, and use it to infect other cells?” Clark asks. “It’s a chicken or egg thing now—we don’t know which is true.”

And still more questions—while HAP2 is present in many taxonomic lineages, including ciliates, insects, algae, and plants, it is not present in mammals or fungi. What enables these organisms’ gametes to fuse? “We don’t know—there have been

a number of theories,” says Clark, noting that Pinello began some preliminary protein modeling on genes in human and mouse genomes in an attempt to pinpoint it. The research is preliminary and Clark is cautious to say much more. “We think we may have a candidate. . . . That’s the thing about science that’s so great—you follow something and that leads you in a totally different direction from where you started.”

CARDIOLOGY TEAM SAVES STREET DOG FROM DEADLY HEARTWORM CONDITION

By Carrie Koplinka-Loehr







ALLISON SHALLA

FLYER, A STREET DOG THAT SUFFERED FROM A DANGEROUS CONDITION CAUSED BY HEARTWORM INFECTION.

“IT WAS A GOOD EXAMPLE OF TEAMWORK.”

—DR. ROMAIN PARIAUT, DESCRIBING HOW THREE SERVICES—
CARDIOLOGY, ANESTHESIOLOGY, AND DIAGNOSTIC IMAGING—
WORKED TOGETHER TO PROVIDE SAFE, ADVANCED PATIENT CARE.

Flyer, a mixed breed dog, has been rescued twice this year: once from Jamaican streets by a Canadian charity and a second time by a team of veterinarians at Cornell University's Hospital for Animals (CUHA).

Flyer is a Potcake, the name given to feral Caribbean dogs with cocked ears who were traditionally fed the caked remains of a rice and pea dish. Flyer lived on the streets and in a sanctuary until Allison Shalla, co-president of Eastern Ontario Potcake Rescue, brought him back to Ottawa last February. Not having received any heartworm prophylaxis, Flyer began taking medication when tests on Valentine's Day indicated heartworm disease.

SERIOUS SYMPTOMS

Two weeks later Flyer became lethargic and produced rusty-colored urine, the telltale sign of caval (pronounced CAVE-uhl) syndrome: heartworms lodged in the vena cava (the vein bringing blood to the heart), right atrium and right ventricle. Tangles of worms ensnare and crush red blood cells, releasing hemoglobin, which discolors the urine.

Heartworms cause one of the most serious parasitic diseases for North American dogs; the disease has also been found in South America, Australia, the Middle East, and parts of Europe and Asia. An infected mosquito bites a dog (or less commonly, a cat) and injects larvae under the skin. Larvae grow for a few weeks, enter a blood vessel, and flow to the pulmonary arteries after traveling through the right side of the heart. Being too large to enter the lung capillaries, they usually remain in place, increasing the likelihood of pulmonary hypertension (high blood pressure in the lungs) and congestive heart failure. A female worm can grow up to a foot long, resembling spaghetti. The shorter male has a corkscrew tail.

Dr. Romain Pariaut, associate professor of cardiology at CUHA, says that caval syndrome is rare in the Northeast. Winter temperatures usually kill mosquitoes, resulting in fewer heartworm cases than in the southern states. In the past 18 months at Cornell, Pariaut has seen only three cases of caval syndrome.

Flyer's new owner Shalla sought help outside Ontario because, as she explains, "Our vets here, including our emergency clinic, didn't have the staff available to deal with caval syndrome." So they arranged for surgery at CUHA. Patients with Flyer's condition can die within two days if the worms are not extracted.

Surgery is risky, Pariaut explains, because dogs with caval syndrome have trouble breathing and are unstable, with poor cardiac output and blood flow. "Basically, they are the worst candidates for anesthesia," says Pariaut. "Unfortunately many dogs will not make it through the surgery."

Luckily for Flyer, Pariaut gained experience fishing for heartworms during his seven years at Louisiana State University. Then he returned to Cornell, where he had completed his residency 12 years earlier.

HEART FISHING

On Sunday, April 2, CUHA's team of eight (including residents, Drs. Oxford, Giacomazzi, Porter, and Tseng, and student Austin) began a surgery that lasted for several hours. Pariaut made an incision in the jugular vein, then inserted into the cranial vena cava a sheath with a "basket" inside. When opened, the instrument resembled a wire whisk with several oblong loops at the end. Guided by live fluoroscopic and ultrasonic images, Pariaut's team went fishing in the heart. They'd wait for about 30 seconds, pull the basket out to see how many they caught, then go back in. Breaking even one worm could have caused Flyer to go into shock and possibly die.

Their total catch? 86 worms.

"It was a good example of teamwork," says Pariaut, describing how three services—cardiology, anesthesiology, and diagnostic imaging—helped each other.

Two days after the surgery, Flyer returned to Ottawa and continued medical treatment to eliminate worms remaining in the pulmonary arteries. Shalla recently reported, "his only complaint is the crate rest, but he is very patient." Reducing physical activity during the recovery months decreases the possibility of dead worm fragments causing blockage in the pulmonary arteries.

According to the American Heartworm Society, heartworm infection is on the rise nationally, partly because pet owners skip doses or don't administer preventive medications. Pariaut says it's good for the public to be reminded about heartworm disease. Owners should give preventive medication year-round. If heartworm disease is diagnosed, advises Pariaut, start medical treatment to eliminate the worms as quickly as possible.



CARDIOLOGY RESIDENT DR. EVA OXFORD DVM '12



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“HE WANTS US TO MAKE DECISIONS OURSELVES AND JUSTIFY WHAT WE’RE DOING, AND HE COULDN’T BE MORE APPROACHABLE AND SWEET ABOUT IT.” —AMANDA LACROIX ’18

EVIDENCE-BASED SUCCESS: NEW HIRE PATRICK CARNEY '06 LEADS BY EXAMPLE

By Carrie Koplinka-Loehr

It's Wednesday morning and the newest clinician on the Community Practice Service (CPS) is rounding. Dr. Patrick C. Carney '06 sits on a low wooden stepstool with five students around him. As one begins, "I have a twelve-year-old dog coming in, incontinent, with general weakness, muscular disease," Carney listens, then quietly asks, "What's on your differential diagnosis list for urinary incontinence?" You can see them sizing up this slight, mild-mannered newcomer as he poses questions and offers comments so rich with experience.

Assistant professor Carney believes students have the knowledge within; it's his job to draw it out. With doctoral degrees in both veterinary medicine and epidemiology, he has the horsepower to champion evidence-based thinking not just in clinic and the classroom, but eventually in his lab and beyond.

EDUCATION IN HIS BLOOD

Carney grew up in Barrington, N.H., and always wanted to teach. "My parents were both professors of education," he says, "so it's kind of engrained in us as a family." Because his uncle was a veterinarian and Carney spent summers hanging around his practice, becoming a vet was on the list of possibilities. The deciding moment came in college when Carney's dog needed to be euthanized. "The vet did such a good job of dealing with a very difficult situation," recalls Carney.

As a student at the College, Carney participated in the Leadership Program and developed an interest in epidemiology. After graduating he completed an internship in small animal medicine and surgery at the University of Pennsylvania and a residency in small animal internal medicine at Oregon State University. He saw clinicians struggle to tap their capabilities, understand their limitations, and know when to refer.

Back east in 2011, Carney worked at Tufts as an internist and clinical assistant professor while renovating a house, starting a family with his wife (who is also a veterinarian) and earning a PhD in epidemiology at the Boston University School of Public Health. "That was very deliberate," says Carney. He assembled all the pieces of the puzzle so when he returned to CPS he could teach people how to be good clinicians.

Amanda LaCroix, '18, says she feels incredibly lucky to have Carney for her first experience in the clinic. "He wants us to make decisions ourselves and justify what we're doing," says LaCroix, "and he couldn't be more approachable and sweet about it." LaCroix says Carney is concise and "has an ability to explain difficult concepts in ways you can understand—he is so brilliant. . . . He also has really emphasized doing journal research and what makes a good study."

LOOKING AT THE EVIDENCE

It's no surprise that one of Carney's favorite books, *Bad Science*, inspired him to pursue evidence-based medicine and challenge standard clinical practices. One example where the evidence is lacking, according to Carney, is the appropriate age for spaying and neutering. "It used to just be 'by six months,'" explains Carney. "Now we know it's a lot more complicated than that. There is some good research happening, but we still do not have a good way of appropriately totting up the risks and benefits for a given age, breed, and sex to come up with the best answer for any given patient."

A second example is the annual administration of the 4Dx test, which checks dogs for four vector-borne infections (including heartworm and Lyme disease). "This is a scientifically exquisite test," explains Carney, "but we have absolutely no evidence that its use as a screening test improves clinical outcomes." He hopes his research program will focus on gaps in clinical knowledge: practices that are routine but don't have enough evidence base behind them. Consider the dog or cat that's due for five vaccines. Do you give them all simultaneously, or, as Dr. Leni Kaplan in CPS recommends, split them into multiple visits to avoid overwhelming the immune system? "We don't have proof of what's right," says Carney. "I sat down with her and said, 'This is a study,' so we're working on a proposal to try to settle that question."

Back in clinic, Carney brings up an email sent by a former colleague seeking an expert opinion. The students offer suggestions; Carney refers to evidenced-based work where it exists. They discuss efficacy and costs. Then the students ask about the process of referring. "Make use of that when you're in practice," Carney tells them. "Make use of me." Clearly, with Carney around, students have a valuable resource to guide them.



“ANYTIME THAT YOU CAN DEMONSTRATE THAT A TREATMENT IMPACTS MANY THINGS, IT BECOMES AN OPPORTUNITY TO DO MORE GOOD. I THINK THE MORE VETERINARY MEDICINE LOOKS AT BROADER IMPACTS, THE BETTER OFF WE ARE.”

—JONATHAN LEVINE '95, DVM '01

IMPACT

Jonathan Levine '95, DVM '01 Alumnus Focuses on Research That Cuts Across Species

By Sherrie Negrea

By Sherrie Negrea

When Jonathan Levine '95, DVM '01 graduated from Cornell with a biology degree, he planned to become a physician. But after a year at medical school, he realized it just wasn't his passion.

So he dropped out and moved to Boston, where he worked at a small animal practice and at Harvard Medical School, conducting research with an immunologist. Those seven months convinced him that veterinary medicine was his calling, and he immediately applied to Cornell's College of Veterinary Medicine for the following year.

"I needed to do a little soul-searching to find out what I wanted to do," Levine said. "What I really liked about veterinary medicine was that it had a lot of the things I liked about medical school. It has this very interesting animal component that goes along with it, and all these different species, a lot of unexplored territory, and opportunity to cut new ground."

At the College, Levine was particularly inspired by Alexander de Lahunta, DVM '58, PhD '63, emeritus professor of anatomy and renowned veterinary neurologist (see page 42). After completing a neurology residency at the University of Missouri and Texas A&M University, Levine followed in de Lahunta's footsteps and became a professor of veterinary neurology at Texas A&M.

Levine said his career choice was influenced not only by de Lahunta but also by his experience working on neurology cases at the animal clinic at Cornell and at Colorado State University, where he did his internship. His fascination with the nervous system and his ability as a veterinarian to use both imaging and physical exams to diagnose neurological problems also reinforced his decision.

"How miraculous it is when you are able to actually treat a problem and have a success," said Levine, now department head

of Small Animal Clinical Sciences at Texas A&M. "It's a really terrific feeling, and for the owner and for the pet, I can't even put to words what that feeling is."

While focusing on neurological diseases in animals, such as brain tumors in dogs, Levine has not forgotten his original interest in human medicine. In his research, he has investigated cures for neurological diseases that have the potential to apply to treatment for humans.

In a clinical trial funded by the U.S. Department of Defense, Levine and his collaborators investigated whether a drug that blocks enzymes, which degrade attachments between cells, could improve urinary function and movement in dogs with naturally occurring spinal cord injury. Levine hopes that the study will speed up the process of testing the drugs in human clinical trials and having them approved for treatment.

"The reason we were so interested in urinary function in that study is that's one of the most important functions that people with spinal cord injury want to regain," Levine says. He and his collaborators have submitted a paper detailing their findings and hope to share their results soon.

In a separate study, Levine and a researcher at MD Anderson Cancer Center have been conducting clinical trials in dogs that have naturally occurring brain tumors to see if delivering micro-RNA to dogs can redirect their immune system to attack tumor cells.

His goal across his research is to discover treatments that will benefit humans as well as animals. "Anytime that you can demonstrate that a treatment impacts many things, it becomes an opportunity to do more good," said Levine. "I think the more veterinary medicine looks at broader impacts, the better off we are."

Sarrah Kaye DVM '12 General Curator/Veterinarian Staten Island Zoo

By Lindsay France

DR. SARRAH KAYE EXAMINES A
FLEMISH GIANT RABBIT.

“As the veterinarian and general curator of the Staten Island Zoo, I tap into the Cornell network regularly. I still draw on the expertise of vets up at the College and diagnostics lab and consult wildlife and exotic specialists about cases and projects.

Our zoo is very small, but it always feels relevant. We have the potential to reach a huge and diverse population of people. So we display local animals alongside species from exotic places to give global conservation issues a local context. We hope that by helping people realize that even in the city they live near nature—raccoons, deer, hawks, salamanders, and rare frogs, migratory birds, and bats—they may care about it a bit more.”

To watch a Spotlight video of Sarrah, visit:
nyc.cornell.edu/spotlights/sarrah_kaye/



“... WE DISPLAY LOCAL ANIMALS ALONGSIDE SPECIES FROM EXOTIC PLACES TO GIVE GLOBAL CONSERVATION ISSUES A LOCAL CONTEXT.”

—SARRAH KAYE DVM '12

Alumni Establish Scholarship to Honor Alexander (Sandy) de Lahunta

“Dr. D”

Tom Scavelli DVM '82 clearly remembers walking into his first class at the College of Veterinary Medicine in the summer of 1978. As the course started, Professor Alexander (Sandy) de Lahunta '58 PhD '63 stood at the front of the room, lecturing about embryology in a booming voice that completely captivated the students.

“He was an extremely dynamic lecturer who knew his material cold and probably was the most passionate educator that I had ever been around,” Scavelli said.

Sitting in the same class was David Krick DVM '82, who was also profoundly influenced by their professor. “He was a larger-than-life figure, and he was always there,” Krick said. “Every time we turned around, he was teaching us something different, whether it was anatomy, neuroanatomy, embryology or applied anatomy.”

Last year, the two alumni decided to recognize de Lahunta, known as “Dr. D,” for his dedication to teaching by creating a scholarship in his honor. After generating support from other alumni in the College on Cornell’s crowdfunding site, they

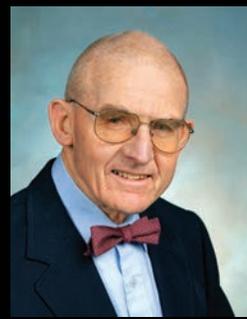
endowed the Alexander de Lahunta DVM '58, PhD '63 Academic Scholarship Fund, which has now awarded its first scholarship.

“For us, it was just a way to say thank you to him and to help the students with all the debt they have and to help them going forward pay for their education,” Scavelli said.

A renowned scholar in veterinary neurology and anatomy, de Lahunta has written and co-authored five leading textbooks and has written 266 articles in peer-reviewed professional and scientific journals. During his 45-year teaching career at Cornell, he was four times the recipient of the College’s Norden Distinguished Teacher Award.

Because he is internationally recognized for his research in neurology, the scholarship will be awarded to a student who exemplifies his passion and knowledge in that field. Each year, the faculty will identify a third-year student who is one of the top performers in neurology and neuroanatomy to receive the scholarship.

The first recipient is Amber Harris '18, now a fourth-year student from El Paso, Texas. Although Harris was not able to



Crowdfunding Campaign for Dr. D Draws More Than 100 Donors

The scholarship honoring legendary Dr. D. got a boost thanks to the generosity of more than 100 alumni who contributed to a November 2016 crowdfunding campaign.

The project, “In the Key of (Dr.) D,” raised an additional \$26,000+ from 115 donors in 30 days. The average crowdfunding gift of more than \$225 was often accompanied by a touching tribute to Dr. D. or an amusing story recounted by a former student.

He remains so popular that we continue to gather gifts in his honor, all of which are added to the scholarship fund.

Anyone who wishes to help us celebrate Dr. D. can still contribute by visiting <https://crowdfunding.cornell.edu/DrD>.

take a class with de Lahunta since he retired in 2005, she is aware of the influence he had on students from the stories her professors recounted about him.

“They would say that when they were students, they couldn’t wait until he had his Friday afternoon rounds because they would be so entertaining,” she said. “They would be waiting with bated breath until Fridays. I wish I could have actually experienced that and been there with him.”

“HE WAS AN EXTREMELY DYNAMIC LECTURER WHO KNEW HIS MATERIAL COLD AND PROBABLY WAS THE MOST PASSIONATE EDUCATOR THAT I HAD EVER BEEN AROUND.”

—TOM SCAVELLI DVM ’82

Since entering the veterinary college, Harris said she has developed an interest in neurology and hopes to work as a clinician and a teacher. “Neurology is kind of a puzzle, and I love puzzles,” she said. “When you do a neurology exam on an animal, the way it acts and the way it moves and how it’s standing — it all gives you clues as to what might be affecting them.”

Both founders of the scholarship say they were also influenced in their careers by de Lahunta. Scavelli, a surgeon at Garden State Veterinary Specialists in Tinton, Falls, N.J., said, “I didn’t follow the neurology path, but certainly his level of professionalism and expertise made me want to go in the direction of being a specialist.”

Krick, a veterinarian at the Dog, Cat and Bird Clinic of Nutley, N.J., added that de Lahunta taught him to demonstrate the highest level of skill in caring for animals. “You could tell he was the best of the best,” Krick said. “I never wanted to disappoint him because he was so good and generous that you never wanted to let him down.”



RECONNECTING & REMINISCING:

REUNION

In early June, more than 420 DVM alumni and their guests returned to the College to celebrate Reunions from their fifth to their sixty-fifth. More than 230 alumni from the classes ending in 2s and 7s gathered to reminisce and reconnect at the long-established parties, presentations and tours. The DVM Class of 1967, led by volunteer Dr. Ferris Gorra, had over eighty percent of classmates returning for their special 50th celebration.

College alumni and guests attended guided tours of the capital expansion construction project and the Teaching Dairy Barn, and learned from faculty in the Clinical Sciences about how Cornell’s research and discovery are at the forefront of the veterinary profession. Provost Michael Kotlikoff hosted a panel led by internationally renowned wildlife health experts (Dr. Steve Osofsky ’89 and colleagues) which offered a thought-provoking discussion on the challenges of saving wildlife and wild places. Alumni, friends and faculty had the opportunity to share special memories during the DVM Welcome Reception, veterinary BBQ, receptions and Class dinners.

“In addition to renewing old friendships and making new, Reunion is a time for reflecting on the gratitude alumni have for the excellent education they received, and for providing the resources necessary to educate the next generation of veterinarians and scientists,” says Lyn LaBar, associate director

of alumni affairs and student programming. “Many alumni make a special gift in their Reunion year, and we are grateful for their generosity and thoughtfulness.”

At his State of the College address, Dean Warnick cited several classes for outstanding participation in giving to the College. This year’s 25 Club Cup, which is shared by the classes out of school 25 years or fewer and reach twenty-five percent or higher in participation in a reunion year, was won by the classes of 1992 and 1997.

This year’s Dean’s Cup, which was established in 1995 by the great “Plaque Class” of 1961 and goes to the class out of school 50 years or fewer with the highest percent of the class making a gift, went to the class of 1967 with an astounding eighty-two percent participation. This total is the highest by any reunion class since 2006. The class of 1967 also had the highest giving of all of the reunion classes, totaling over \$33,000.





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October 6–October 8, 2017
Ithaca, NY

HOSTED BY
Cornell University College of Veterinary Medicine & New York State Veterinary Medical Society



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IN MEMORIAM

Since the Spring 2017 'Scopes, the College has been notified of the passing of the following:

- Dr. Robert E. Cornell '55, March 24, 2017
- Dr. Richard Delgado '55, February 4, 2017
- Dr. Henry F. Doerge '57, March 26, 2017
- Dr. Jeanne George '71, April 3, 2017
- Dr. David E. Harling '55, June 11, 2017
- Dr. Peter P. Kintzer '85, March 2, 2017
- Dr. Richard R. Lawton '61, December 27, 2016
- Dr. John C. Meyer '59, June 22, 2017
- Dr. Robert A. Moore '57, February 5, 2017
- Dr. Carl D. Nelson '59, March 15, 2017
- Dr. Harry Prussner '72, June 5, 2017
- Dr. Herbert F. Schryver '54, June 26, 2017
- Dr. Joseph L. Thorne Jr. '53, December 30, 2016
- Dr. Frederick Tierney '62, April 4, 2017
- Dr. Arthur M. Underwood '51, April 28, 2017
- Dr. Bruce W. Widger '51, March 6, 2017



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- Outcome of Trauma in Emergencies
- Studying Feline Sepsis in Emergency Situations
- Testing a new Pain Reliever in dogs with Intervertebral Disk Disease
- Lymph Node Tissue Banking
- Utilizing Platelet Rich Plasma (PRP) in Dog with Arthritis in One Knee
- Evaluation of a New Drug in Dogs with Thrombocytopenia
- Understanding Gastric Outflow Obstruction in Rabbits
- Determining how Phenobarbital in Cats affects Thyroid Function
- Testing an Epidural Catheter in Dogs for Injectable Pain Medications
- Understanding the Genetics of Feline Infectious Peritonitis (FIP)

Correction:

An article in the Spring 2017 issue of 'Scopes' titled "How to Heal Veterinary Student Debt," misquoted Dr. Paul Pion '83, president of Veterinary Information Network (VIN), failing to accurately communicate Pion's views on the issues of veterinary student debt.

students should not be asked to pay for these," he says, "the expansion in administration, infrastructure, faculty and research has raised the cost of operating a veterinary school." Pion also takes issue with the current approach in veterinary education. "We're still trying to train everybody to do everything when the current reality is that the vast majority focus upon one or a few species," he says. "All this effort and money goes into preparing students for a test [the NAVLE] that's not really that selective, and it's become more of a business than a standard that tells us anything. I understand it is hard to rollback programs and that every professor thinks the details of their domain are essential knowledge for every veterinary graduate, but if we don't make the needs and best interests of the consumer (student) the primary driving force in curriculum choices, we will never succeed in designing efficient and effective curricula or controlling education costs."



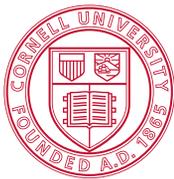
The following sections are updated versions of Dr. Pion's quotes appearing on pages 14 and 18 of the magazine:

Pg 14: Dr. Paul Pion '83, president and co-founder of Veterinary Information Network (VIN), and a vocal advocate for addressing veterinary economics, believes it's the trend of higher education to balance their budget by raising tuition and class size. "I'm a big believer in supporting basic research and advanced diagnostics, but

Pg 18: "These are big problems; they're multifactorial and have evolved over years and decades," says Pion. "There's not going to be one single solution—there's going to be several little pieces that collectively move towards it."







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Cardiology resident Eva Oxford DVM '12, examines Trindle the dog.

