SPRING 2017

SCOPES

ECONOMICS AND ENTREPRENEURSHIP: CHANGING THE FACE OF VETERINARY MEDICINE

Cornell University
College of Veterinary Medicine

'SCOPES SPRING 2017

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COVER: THE VETERINARY PROFESSION IS CHANGING—LEARN HOW ENTREPRENEURSHIP (PAGE 8) AND ECONOMICS (PAGE 13) ARE SHAPING THE MODERN VETERINARIAN.

THIS PAGE: JIM, A LABRADOR RETRIEVER PUPPY THAT RECEIVED LIFE-SAVING SURGERY THANKS TO TEAMWORK AMONG A GENEROUS DONOR, THE REFERRING VETERINARIAN, AND CUHA SPECIALISTS (SEE PAGE 38).

VETERINARY ENTREPRENEURSHIP AND ECONOMICS

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

"WE WERE REMINDED THAT VETERINARIANS CAN START SOFTWARE COMPANIES, APPLY NEW TECHNOLOGY TO DIAGNOSTIC TESTS AND TREATMENT, START NON-PROFIT ORGANIZATIONS, OR BECOME INDUSTRY EXECUTIVES."

As I write this letter, the College is still tidying up from the success of a brand-new experiment—an Animal Health Hackathon—the first of its kind, but certainly not the last. You might scratch your head at the term "Hackathon"—it was new to many of us as well. It is a combination of the term computer hacking—in which determined and creative individuals devise new, and often unusual ways to solve a problem—and marathon, reflecting a focused effort over a short time period. Students in computer programming, engineering, and design are familiar with this kind of process—why not veterinarian students?

This was our thinking when we, in partnership with Entrepreneurship at Cornell and my colleague Professor Wesley Sine with the SC Johnson College of Business, decided to launch the Animal Health Hackathon this January. We wanted to encourage students to think big, think different, and try their hands at coming up with a new, disruptive innovation in the veterinary field. Initially, we were unsure if veterinary students would be willing to take on the challenge when the clinics, classes, and studying take up so much of their time. We couldn't have been happier when 32 DVM students participated in the event, along with 92 other students from across the university, to devise some truly creative solutions to animal health problems. We were also thrilled to have so many alumni and colleagues contribute their financial support, time, expertise, and mentorship to the event, making it a fantastic networking and learning opportunity for everyone involved. (Make sure to read more about the event on page 8.)

A STUDENT BRAINSTORMS AT THE ANIMAL HEALTH HACKATHON

Beyond the exciting ideas and connections that sprang from the event itself, the Hackathon also highlighted the breadth of veterinary medicine and the wealth of opportunities that exist within the profession. We were reminded that veterinarians can start software companies, apply new technology to diagnostic tests and treatment, start non-profit organizations, or become industry executives.

These reminders are important in light of the current economic pressures that so many new and aspiring veterinarians face. As you'll read in our story on page 13, the debt-to-income ratio for our professionals is cause for concern, and the College will be taking an active role in ensuring that our students and graduates have the best preparation possible when it comes to managing finances and achieving career success. This preparation not only involves comprehensive education on student loans and budgeting, but also expanding our students' awareness of and training for potential career opportunities that can be both personally and financially fulfilling. It will also involve more in-depth business education to prepare and encourage students to consider practice ownership and other entrepreneurial activities.

Of course, this increased emphasis on business education will be done so that it complements, rather than detracts from the foundational, science-based medical education that has been our hallmark of excellence for so many years. I invite our alumni, friends and supporters to contribute your ideas, expertise and enthusiasm for the veterinary profession to help us equip our graduates to find both success and career satisfaction in the modern economic landscape.

Lorin D. Warnick

PROFESSOR EMERITUS BUD C. TENNANT REMEMBERED AS RESEARCHER, MENTOR AND FRIEND

DR. BUD TENNANT WITH WIFE, PRISCILLA TENNANT

Dr. Bud C. Tennant, James Law Professor of Comparative Medicine emeritus, died Nov. 16, 2016 at the age of 83. Tennant had a long and distinguished career at Cornell University, retiring in 2013 after more than 40 years at the College.

A large-animal internist, he received his DVM from the University of California-Davis in 1959, and in 1973 was board-certified by the American College of Veterinary Internal Medicine, an organization that he helped to found.

Tennant joined the Department of Clinical Sciences at the College in 1972 as a professor of comparative gastroenterology. His research interests included gastrointestinal and liver diseases of domestic animals and viral hepatitis, and he continued to pursue them even after retirement. Tennant's work in viral-induced liver disease using a woodchuck model has had a predictive influence on clinical therapeutic trials in humans, and he was awarded the 2016 Baruch S. Blumberg Prize by the Hepatitis B Foundation. After retiring, Tennant continued researching the pathogenesis of serum hepatitis in horses.

Tennant received the Robert W. Kirk Distinguished Service Award in 1999, and in 2002, was formally acknowledged by the New York State Veterinary Medical Society for his outstanding service to veterinary medicine in New York State.

"Dr. Tennant was the ultimate university professor; he had wide ranging interests in addition to his work as an internal medicine clinician, teacher, and researcher. He was a wonderful mentor, a thoughtful contributor to decisions of the faculty and College, and a constructive critic for many individuals that he worked with and helped over the course of his career," said Dean Lorin Warnick. "And for many, he became a close and valued friend. We will deeply miss him."

"Dr. Tennant was the most distinguished university professor I have ever met, and as kind a gentleman as I have ever known," said colleague Dr. Thomas Divers. "He was my closest collaborator on equine liver disease projects, and I will miss our travels and his frequent visits to my office to discuss our research and veterinary medicine, and share many stories from his life."

"DR. TENNANT WAS THE ULTIMATE UNIVERSITY PROFESSOR; HE HAD WIDE RANGING INTERESTS IN ADDITION TO HIS WORK AS AN INTERNAL MEDICINE CLINICIAN, TEACHER, AND RESEARCHER. HE WAS A WONDERFUL MENTOR, A THOUGHTFUL CONTRIBUTOR TO DECISIONS OF THE FACULTY AND COLLEGE, AND A CONSTRUCTIVE CRITIC FOR MANY INDIVIDUALS THAT HE WORKED WITH AND HELPED OVER THE COURSE OF HIS CAREER."

—DEAN LORIN WARNICK

COLLEGE LAUNCHES FIRST-OF-ITS-KIND PROFESSIONAL MASTER'S DEGREE PROGRAM

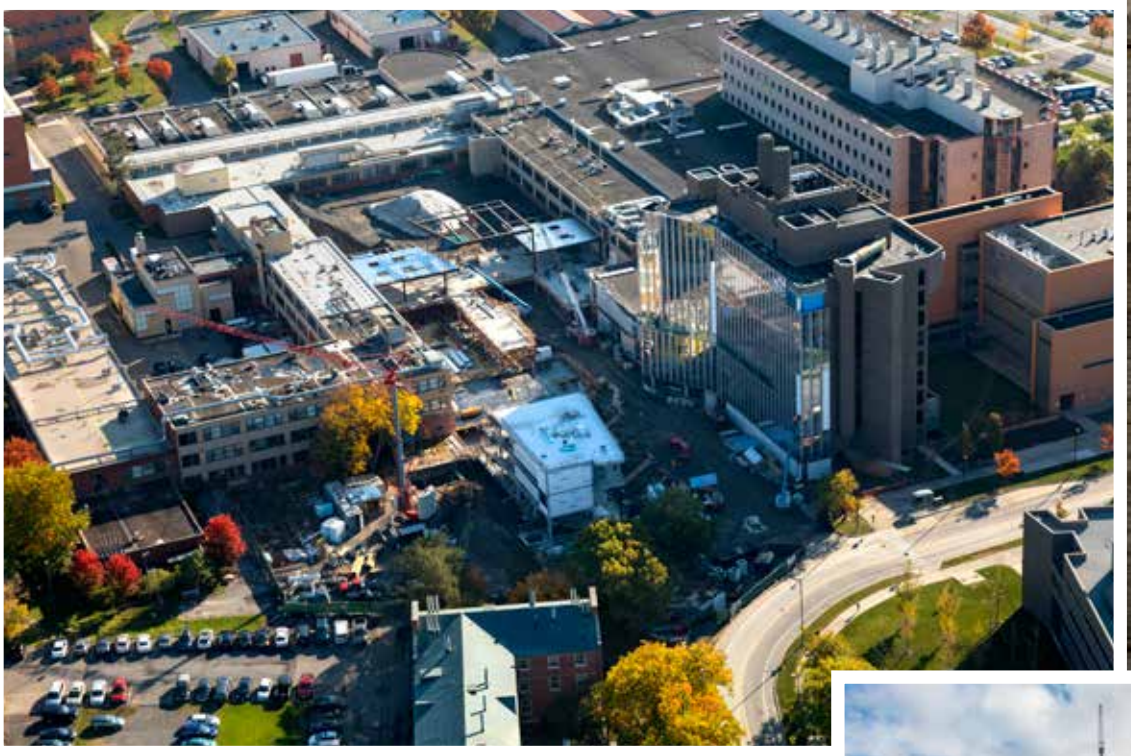
"OUR NEW DEGREE PROGRAM WILL GIVE GRADUATES A HIGHLY COMPETITIVE EDGE AND OPPORTUNITY FOR ADVANCEMENT IN THEIR FIELDS."
—DR. DWIGHT BOWMAN

The College's Department of Microbiology & Immunology has launched a new degree program, the Master of Professional Studies (MPS) in Veterinary Medical Sciences, with a concentration in Veterinary Parasitology. This unique program is designed to provide students with rigorous, specialized training in all aspects of veterinary parasitology, from biology and pharmaceutical development to legislation and beyond. This type of comprehensive professional training is the first of its kind in the parasitology field.

"In talking with working professionals over the years, it became clear to me that there was great demand for a structured program that would allow for in-depth, practical, and hands-on training in veterinary parasitology," says MPS Program Director, Dr. Dwight Bowman. "Our new degree program will give graduates a highly competitive edge and opportunity for advancement in their fields."

According to Dr. Avery August, department chair and staunch supporter of the program, the MPS in Veterinary Parasitology will serve as a model for developing other specialty degree programs within the College. "Our inaugural class is in its first semester of study right now and we're incredibly pleased with the caliber of our students. We're excited about the future of the program and seeing it grow and evolve."

Construction Update: A Bird's Eye View



CHRIS KITCHEN PHOTOGRAPHY

THE VETERINARY RESEARCH TOWER NOW SPORTS ITS NEW GLASS CURTAIN WALL, WHILE CONSTRUCTION ON THE NEW WING CONTINUES WITH INTERIOR FRAMING AND INFRASTRUCTURE INSTALLATIONS.

THE LATEST PROGRESS

"I USED THIS AS AN OPPORTUNITY TO DISCUSS THE SHIFTING CULTURE OF VETERINARY MEDICINE AND THE IMPORTANCE OF KEEPING PRIVATE OWNERSHIP VIABLE FOR FUTURE GENERATIONS OF PRACTITIONERS."
—YUAN KANG '17

DR. MEG THOMPSON BEGINS TERM AS NYSVMS PRESIDENT

Dr. Meg Thompson, assistant dean of hospital at the Cornell University College of Veterinary Medicine and director of the Cornell University Hospital for Animals began her term as New York State Veterinary Medical Society (NYSVMS) President on January 1.

In this one-year position, Thompson plans to oversee the continued structural growth of the organization which includes finalizing a chapter structure that provides regionals with governance choice and liability protection. She will also continue to forge relationships with other animal-interested organizations, with "hopes to build an advisory board composed of members of these organizations that can ultimately strengthen our legislative positions and encourage collaboration on animal care and welfare issues within New York State."

Additionally, Thompson aims to provide solid leadership in the emerging field of telemedicine beyond teleradiology, with the goal of helping the state "lead in the structuring of this inevitable next step in healthcare."

"The NYSVMS will continue to be strong where strong is still needed legislatively," says Thompson, "and forward-thinking as new issues arise."

Thompson has been actively involved with the NYSVMS for much of her time at Cornell—she received the NYSVMS President's Citation in 2011 and 2012 for Excellence in Conference Organization for her work with the New York State Veterinary Conferences. She served as co-chair for the fall NYS Veterinary Conference from 2010-2016 and for the spring conference since its inception in 2013 to 2016.

NEW NATIONAL APPOINTMENTS:

Dr. Daniel Fletcher named president-elect of the American College of Veterinary Emergency and Critical Care

Lynette DeGouff, LVT, VTS, named president-elect of Academy of Veterinary Technicians in Anesthesia and Analgesia

YUAN KANG '17 WINS NATIONAL VETERINARY BUSINESS SCHOLARSHIP

Yuan Kang '17 has won the Simmons Educational Fund (SEF) student award, marking the first time a Cornell student has received this national scholarship. The award recognizes and supports future business leaders in the veterinary industry.

The Simmons Educational Fund is a non-profit corporation created to educate practitioners and students about the business of veterinary medicine, and offers financial support to veterinary students through the Business Aptitude Award Program. The program provides a $1,000 scholarship to a business-minded veterinary student at every school in the country, and offers each of those winners a chance to compete for the national award, which includes a $15,000 scholarship.

Competitors research and present a veterinary business problem; Kang's award-winning presentation discussed how to approach convincing a retiring small animal practice owner to sell the practice to an associate rather than a corporate merger. "I used this prompt as an opportunity to discuss the shifting culture of veterinary medicine and the importance of keeping private ownership viable for future generations of practitioners," says Kang.

"I'm always blown away by the skill and intelligence of the competitors for our national award, but Yuan rose to the surface with admirable clarity and precision in her presentation," says SEF representative Joe Stephenson.

"We are thrilled that Yuan has been recognized for her efforts and potential as a future veterinary business leader. This is a significant and highly selective award, and we are proud that Yuan was chosen from such a talented field of students representing our peer institutions." says Dr. Kathy Edmondson, assistant dean for learning and instruction.

WHAT IF YOUR IDEA COULD CHANGE THE FACE OF VETERINARY MEDICINE?

CORNELL ANIMAL HEALTH HACKATHON

On January 27–29, the College co-hosted the first-ever Animal Health Hackathon—an event that partnered students from across degrees, majors and colleges at Cornell with professional mentors to generate innovative solutions focused on animal health.

Co-sponsored by Entrepreneurship at Cornell and Pet Partners, the Hackathon was held at the eHub Collegetown, a flexible co-working space designed for collaboration. The event kicked-off with presentations and panel discussions from innovators and leaders from a range of organizations, including clinics, startups and academia. By the end of that day, students had broken up into multidisciplinary teams—including students in business, veterinary medicine, engineering, programming, and design—to begin devising ideas.

The hacking continued for a full day on Saturday, with mentors helping each group refine their "PiNG"—Progress, Needs, and Goals. On the final day of the event, the Hackathon judges (Dr. Monica Dias Figueiredo of Merial; Dr. Andrea Landsberg of Abbott Molecular Diagnostics; Dr. Nick Nelson of Pet Partners LLC; and Dr. Mark Olcott '95 of VitusVet) visited each group for speed-round judging, in which groups would give one-minute pitches on their idea.

Out of the 26 teams, 12 were selected to give four-minute presentations in front of the entire audience. These ideas ranged from a specially-designed comb to make topical medication applications easier for pet owners (team TransFur), to an auditory processing algorithm for early detection of domestic bird illness (team Chirp Alert).

hack·a·thon

'hakə,THän/

noun, informal

An event, typically lasting several days, in which a number of people meet to engage in collaborative problem-solving.

BRING IDEAS. WIN CASH PRIZES. INVENT THE FUTURE OF ANIMAL HEALTH.

ANIMAL HACKATHON CORPORATE PARTNERS:

PET PARTNERS
MERIAL
ZOETIS
ETHOS VETERINARY HEALTH
NESTLÉ PURINA
CARING HANDS ANIMAL HOSPITAL
VITUS VET
LIVE OAK BANK
BARK BOX

Next, judges then named winners in three 'vertical' categories:

Service award team Animal Friendly: a web extension for online shopping to help users identify which products were created humanely and which were not.

Software award team Hive Mind: a service for beekeepers to monitor and analyze their honeybee brood frames using machine learning and image segmentation algorithms.

Hardware award team Retriever: A wearable device that harnesses multiple low-power wireless technologies and a passive NFC failsafe to maximize the chances that a lost pet is returned. The free companion app leverages the community to multiply search efforts and connect pet lovers.

The Grand Prize went to **team Retriever,** a truly multidisciplinary group comprised of Erica Feldman DVM '18, Ezgi Demirayak MEng CS '17, Luis Plaz, MS IS '17, Matthew DiFazio '18, Saloni Joshi MS IS '17, and Talia Coppens DVM '20.

The group spent the bulk of their time researching existing technologies, identifying pain points, and surveying veterinary students and pet owners. "We weren't expecting to win," said a delighted Coppens after just receiving the news. "We were just so 'in it' for those two days, focused on making the best product possible, not on the competition itself."

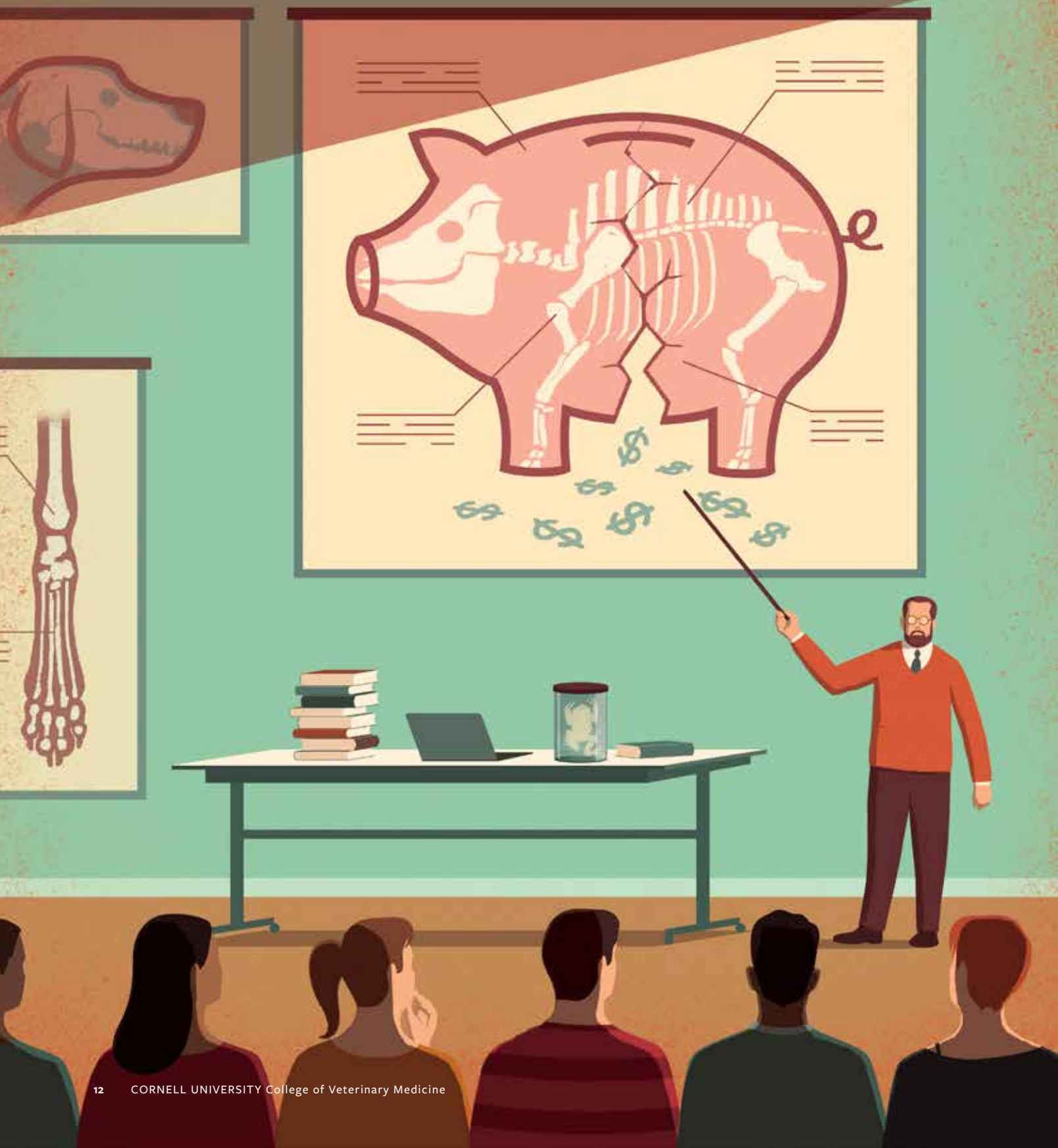
"I was very impressed with all the work done over the weekend by all the teams that participated," says Dean Lorin Warnick. "It's very inspiring to see such enthusiasm, creativity, and innovative thinking directed towards animal health and veterinary medicine. The teamwork by students from disciplines across campus and their interactions with speakers and mentors were highlights of the weekend. My hope is that this will be just the beginning in terms of the entrepreneurial spirit that's been sparked at this event."

TEAM RETRIEVER, WINNER OF THE HACKATHON'S GRAND PRIZE, POSES WITH DEAN LORIN WARNICK.

"THE ANIMAL HEALTH HACKATHON WAS A HIGHLIGHT OF OUR EDUCATIONAL CAREERS, AND SOMETHING WE WILL BE PROUD OF FOR THE REST OF OUR LIVES."
—TEAM RETRIEVER

TEAM SALUS DISCUSSES THEIR INNOVATION, A LITTERBOX FOR AT-HOME URINALYSIS TO HELP WITH EARLY DIAGNOSIS OF FELINE KIDNEY DISEASE AND DIABETES.

LEFT: TEAM FITFIDO WORKS ON THEIR APP THAT HELPS DOG OWNERS MANAGE THEIR PETS' WEIGHT. **RIGHT: TEAM TAKE FLIGHT** BRAINSTORMS ON THEIR PROSTHETIC FEATHERS FOR BIRDS. **BELOW: TEAM RETRIEVER'S** EZGI DEMIRAYAK, MENG CS '17, PRESENTS THEIR INNOVATION.



HOW TO HEAL VETERINARY STUDENT DEBT

By Lauren Cahoon Roberts

Veterinarians are necessary. This isn't news to pet owners, animal lovers, or farmers who rely on these professionals to maintain animal health and well-being. But their necessity doesn't end there. The veterinarian is a key player in public health policy and research—bringing crucial understanding to zoonotic and infectious disease, as well as food safety and security. Veterinarian scientists make vital discoveries on dangerous diseases and life-saving drugs, and reveal new insights to basic biology. In sum, we need vets. Yet, many young and aspiring DVMs are finding the financial side of the career to be increasingly challenging.

Along with other U.S. veterinary schools, the Cornell University College of Veterinary Medicine has experienced the crunch from outside economic pressures. While the Cornell veterinary graduates enjoy better employment rates, higher salaries, and lower median debt than the national average, many face daunting statistics: the median debt-load of a CVM graduate in the Class of 2016 totaled around $152,000. At the same time, starting salaries for graduates entering private practice have not kept pace, hovering around $73,000. The result is a debt-to-income ratio of roughly 2:1. Dr. Lorin Warnick, Austin O. Hooey Dean of Veterinary Medicine, has named the problem one his top strategic priorities. "We're taking this issue very seriously, and looking closely at the practical ways to improve it," he says.

Between a rock and a hard place

Debt is a large portion of the financial challenge for many graduates. Since 1989, mean educational debt for all CVM students, including those without debt, rose at an average annual rate of about 7%. Fortunately, the increase has slowed, holding steady or with a slight decline over the past five years.

Government support for higher education and loan programs has waned over the years, shifting the burden of payment onto students and families. Additionally, personal debt overall increased both during the easy-lending days before the recession beginning in 2008, and in the years following as private resources declined. On top of this, veterinary education is expensive. "Veterinarians are educated to work with a wide variety of species," says Warnick. "It takes a lot of resources to provide

ILLUSTRATION BY DAVIDE BONNAZZI

the hands-on training that is a hallmark of veterinary education, including specimens and surgical labs, which are costly to provide and maintain."

Nevertheless, tuition covers only 14% of the entire CVM operating budget. "It doesn't come close to covering the cost of the education," says Dr. Marnie FitzMaurice, director of veterinary curriculum. "It's important to note that our tuition is increasing at a slower pace than that of the University as a whole; it isn't just veterinary school that's expensive, it's systemic to higher education in general." According to the U.S. Department of Education, tuition at four-year colleges has more than doubled over the past three decades—even after adjusting for inflation. The total student loan debt is now over $1.3 trillion, with average outstanding balances (adjusted for inflation) increasing by roughly 25 to 30% between fiscal years 2009 and 2015 alone. Since 2000, tuition at non-profit colleges increased by roughly 30%, while room and board increased by 23%.

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 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."

"THERE IS A SUPPLY-DEMAND ECONOMIC ASPECT TO THIS ISSUE," SAYS WARNICK. "IN GENERAL, MOST PEOPLE ARE MORE WILLING TO PAY MORE FOR HEALTH CARE FOR PEOPLE THAN FOR ANIMALS."

—DEAN LORIN WARNICK

Warnick recognizes Pion's point, but notes that a "comprehensive, comparative scientific foundation," is integral to Cornell's sterling veterinary education, and that some portion of the cost of that training does have to be paid for through tuition. "Schools are certainly looking at more ways to focus curriculum and ensure training is economical," he says. "But we don't want to lose sight of the value scientific and medical advances have made over the last few decades. Additionally, a broad curriculum prepares graduates for a wider variety of career options and opportunities in life."

While educational debt is a reality for most professional-school graduates, veterinarians have an extra challenge: most starting salaries are comparatively low. "We take on a physician's debt, if not more—but we make the equivalent of someone with an undergraduate engineering degree," says Dr. Tony Bartels, debt educational director at VIN. "The cost of education has greatly outpaced the starting salaries of veterinarians."

"I think the income is a bigger deal," says Dr. Kerry Ryan, an associate veterinarian at Mendon Village Animal Hospital in Mendon, N.Y. "Honestly, the student debt would be fine if we were making more money. But as it is, the salary is not sufficient for the amount of work you do and the amount of education you have." This sentiment is a fairly universal one among DVM graduates who are dealing with the reality that veterinary care is a service that some clients will forgo when finances feel tight.

"The economics of animal health care is a big factor," says Warnick.

"People are willing to pay more for human health care than for animals', plus third-party payment is typical in human health." Nevertheless, certain career choices can lead to higher incomes for veterinarians. Owning a private practice can be a more profitable option, as is going into certain board-certified specialties, such as radiology, surgery, and ophthalmology. Industry jobs within pharmaceutical companies can also be highly lucrative.

"I don't think any of us would advise students to choose their career path based entirely on money," says Warnick. "But we do want them to be able to meet their financial goals and be entrepreneurial when thinking about their work."

Different finances, different futures

Few veterinary students decide on the career for financial reasons—but the economic realities after graduation have been on many CVM graduate's minds, no matter what career path they're on.

Dr. Julia Miller '12 is in a post-doctoral position at the College, with plans to pursue a career in veterinary academia. While lucky enough to get in-state tuition and have no undergraduate debt, she now has $215,000 worth of loans from her four years of veterinary education, the cost of living, and deferred payments from her year-long internship.

This amount has grown from her original $164,000 owed when she first left veterinary school. "I'm in the middle of the pack in terms of debt load," she says, noting that the size of her debt load is due in part to a lack of financial savvy during veterinary school. "I just didn't think about how it all adds up," she says. Her subsequent internship added to the debt load. "Economically it will never benefit you to do an internship, as you will spend that year deferring your loans and accruing more interest—that's a huge amount of money," Miller says. But from an educational and medical view, Miller says an internship is valuable. "For me, I'm interested in teaching and specializing," she says. "I'm not driven by the monetary aspect." To help manage the monthly payments, Miller is now on an income-based repayment plan, which caps payments at a defined percentage of a borrower's income. Fortunately, Miller and others who choose a career in academia will qualify for loan forgiveness.

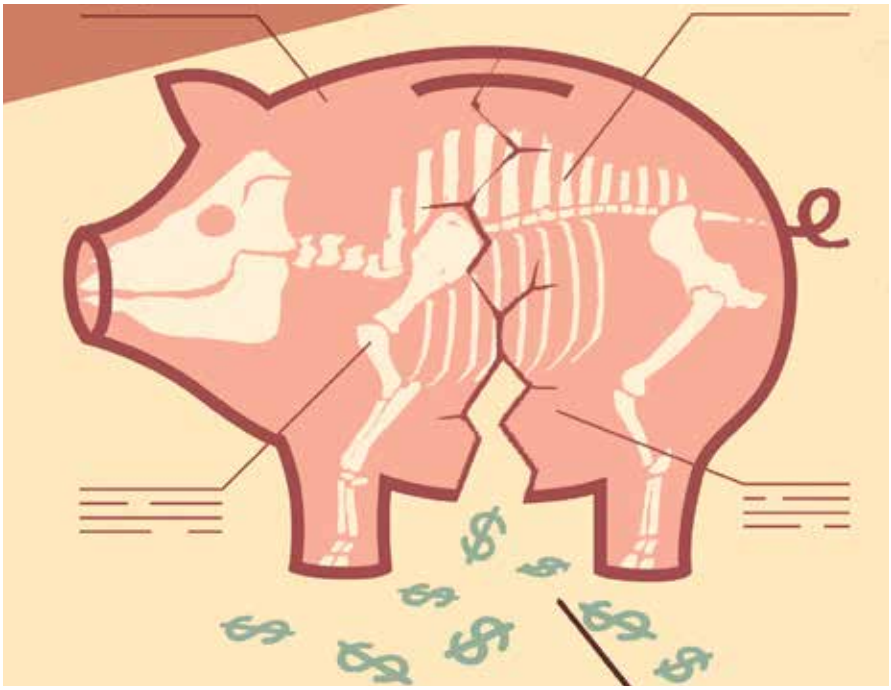
Dr. Kerry Ryan '12, the associate veterinarian at Mendon Village Animal Hospital mentioned above, has always been mindful of her money. "I remember as a teenager, a vet in his mid-forties—who I thought very highly of and who worked very hard—told me he was finally done paying off his student loans," says Ryan. "I was struck by how long it took to pay that off." So Ryan worked diligently for two years before going to veterinary school, which allowed her to take out loans for tuition costs only. During veterinary school, she worked a number of part-time jobs—an approach that she admits isn't for everyone. "There were a lot of times where I would work overnight at the hospital and then went straight to class the next day. Thankfully I can function of fairly small amounts of sleep—I know everyone can't do that."

While just four years out of veterinary school, Ryan has managed to pay off half of her student loans. She has done this through cost-efficient living—driving a fuel-efficient car, keeping home energy costs to a minimum—and careful attention to her debt. While she is on the income-based repayment plan, she makes two or three payments per month—and is always assessing if she can pay more towards it. "I make my full payment at the first of the month, and then half-way through the month I look at my budget to determine if I can afford to pay some more," she explains. "In my mind, having any kind of debt is an emergency. It's a top priority for me."

Dr. Ingrid Rhinehart '11, has just purchased her own practice—Briar Patch Veterinary Hospital, in Ithaca, N.Y. She views it as the best way to maximize her earnings while doing what she loves. "I didn't become a veterinarian for financial reasons," she says. "It was the lifestyle and career I wanted." Originally trained as an economist, Rhinehart went into veterinary school knowing she wanted to own her own practice. She attended practice-buying seminars at conferences, networked with accountants and lawyers who specialize in the transaction, and, upon graduation, sent letters to existing practices asking them if they would be willing to sell. The hard work paid off. "I see young

DR. JULIA MILLER

DAVIDE BONNAZZI



"WE ADVISE THEM TO LIVE LIKE A STUDENT NOW SO THEY CAN LIVE LIKE A DOCTOR LATER."

—DR. KATHY EDMONDSON

DVMs saying that because of all the debt they've already incurred, they'll never be able to buy a practice—but that's a misconception," she says. "Even with a lot of existing debt, if you have good credit, you can buy a practice." Rhinehart is less than a year into owning Briar Patch but sees it as the ultimate solution to her debt. "You are taking on more debt, and you are certainly banking on yourself," she says. "But I feel like I've finally settled into my true career, and I do feel it will pay itself off. I'm glad I did it—even though right now I have scary numbers that come in the mail every month."

CVM Solutions: getting heads out of the sand

No matter who you talk to about student debt, the consensus is clear—more needs to be done.

According to Miller, the first action to take is educating students. "A lot of people have their head in the sand," she says, stressing that students need a strong dose of reality early on "to get them thinking about being as frugal as possible so they can leave with the least amount of debt as possible."

The College is on it. Currently, first-year DVM students have a mandatory class meeting that encourages them to think strategically about their career goals, personal finances, and loans, with the goal of helping them limit or reduce borrowing. Students are asked to go through the CVM student loan scenario calculator—an online tool that allows them to manipulate variables such as the size of their loans, length of time until payoff and associated interest rates, and their projected salaries at different points in their career. It shows exactly how much they will owe and what their monthly payments will be. It also allows them to compare that information, which is based on standard loan repayment assumptions, with the various income-based repayment plans, including a calculation of the projected taxes that would apply to any funds that would be forgiven. Each year, students receive a report summarizing their cumulative debt totals for loans administered by the College. "We advise them to live like a student now so they can live like a doctor later," says Dr. Kathy Edmondson, assistant dean for learning and instruction. "Most of them are already living frugally." Warnick agrees, noting that while educating students about budgeting is a necessary part of the solution, it only addresses a part of the overall issue. "It doesn't solve the larger problem—but for the individual student, it can be very impactful."

Each year, the College also hosts presentations by Heather Jarvis, a national expert in student loan repayment plans, who presents an overview of the various options, current terms, and interest rates. Members of the College administration and student services staff also meet with Jarvis to discuss recent and potential changes to student loan programs in greater depth.

Rhinehart would like to see more mandatory business education for DVM students, including information on practice ownership. "We should really be helping people understand that, not only *can* you own a practice with this level of debt—maybe you *should*," she says. "It's an avenue that isn't as heavily focused on compared to preparing for internships or residencies."

The College will be increasing its focus towards business education; Warnick plans to incorporate new coursework on entrepreneurship and veterinary business management. Additionally, in January, it co-hosted the world's first Animal Health Hackathon, which united business, engineering, and veterinary students at Cornell with alumni mentors to generate novel solutions in animal health. "The event sparked creative, entrepreneurial thinking in our veterinary students, and allowed them to network with innovators and leaders in the field," says event manager Len Johnson, assistant dean for marketing and communications.

CVM Solutions: lightening the load

The College also aims to attack debt through reducing the cost of the overall education for individual students. One

JODI JOSEPH '17 EXAMINES A PATIENT

"IF THEY WANT PEOPLE WITH THIS LEVEL OF TRAINING, THE GOVERNMENT NEEDS TO HELP. I WOULD LIKE TO SEE THEM ADJUST THE STUDENT LOAN INTEREST RATES."

—DR. JULIA MILLER

method will be through formalizing a seven-year, joint Bachelor's/DVM program for Cornell undergraduates who can go straight to veterinary school after completing their junior year.

Another major effort includes scholarship aid. "We're making scholarships for DVM students a priority for our philanthropy," Warnick says. "And we'll continue to do our best to provide scholarship aid where we can to help people most in need." Currently, 82% of CVM students receive scholarship aid—a percentage the CVM administration aims to maintain even after the class size increases from 100 students to 120 later this year, with the Class of 2021. The total scholarship dollars awarded to College students in the last three years averaged over $2.2 million, but there is still unmet need, and the College is committed to doing more.

Jodie Joseph '17 is making sure to take advantage of both the funding available from the College and from external sources—noting that even smaller awards can add up and make a difference. "I was able to reduce my fourth year loans by half because of all of these "little" scholarships," says Joseph.

Michele Cestone, whose family foundation funds annual scholarships to vet students all four years, notes that gifts like these have broad impact. "When you help a vet student, you're really helping animals in an exponential manner—for each vet we help, we are able to help countless animals for many years to come," he says, noting that some of the students his scholarship has supported have gone on to treat his own pets. "You really get to see the fruits of your donation come back in so many different ways."

Indeed, scholarships often determine whether a student will become a veterinarian at all. "I can promise you that without the grant and scholarship programs available to me as an undergraduate and veterinary student here [at the College], I would still be out there scrubbing kennels," says Shanna Landry '13 DVM '17. "I appreciate my scholarships more than words can express."

Getting government involved

The College is working to increase scholarship support, loan counseling, and business education, and students and graduates are carefully managing finances and making savvy career decisions—yet a significant portion of the problem will remain untouched by these efforts as long as higher education prices and loans remain high.

"We need to go to the govern-ment to address this issue," says Miller. "If they want people with this level of training, the government needs to help. I would like to see them adjust the student loan interest rates."

The American Veterinary Medical Association (AVMA) takes an active role in advocating for legislation that addresses student debt solutions. This past year, AVMA advocated for solutions such as abolishing fees on federal student loans, lowering interest rates on federal student loans and expanding the student loan interest deduction. "Our collective goal is to reduce the debt-to-income ratio, which presently is about 2:1, to about 1.4:1," says Gina Luke, AVMA assistant director of governmental relations and advocacy & policy. Luke encourages veterinarians to join the AVMA Congressional Advocacy Network and to sign up for the AVMA Advocate in order to become actively involved in combating educational debt at the federal level.

A pathway still worth walking

Veterinary medicine is a profession offering rewarding career opportunities and a chance to make a real difference in the world, but also comes with financial challenges for many new graduates. Preparing veterinarians for financial pressures will continue to be a complex challenge. "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." As more players in the veterinary world actively work to address the issue, this rate of progress looks to pick up. For Warnick, there's hope that this trend will help the profession thrive again. "I still think investing in a veterinary medical education in the United States is a good thing to do," says Warnick. "This is a single degree that gives you entry into many career paths—many of which allow for challenging intellectual work, is often service oriented, and can be very emotionally rewarding. I'll continue to work to ensure that people from all walks of life and socioeconomic backgrounds can find a pathway to afford a veterinary medicine career."

CURRENTLY

82%

OF CVM STUDENTS RECEIVE SCHOLARHIP AID

Compounding Costs

EXPENSES DURING VETERINARY SCHOOL	NEW YORK STATE RESIDENT	NON-NEW YORK STATE RESIDENT
Tuition and Fees	$33,732	$49,492
Room and Board	$ 9,000	$ 9,000
Books and Supplies	$ 1,000	$ 1,000
Personal Expenses	$ 8,000	$ 8,000
TOTAL STANDARD BUDGET	$51,732	$67,492

HELPFUL HORSES: THE CORNELL EQUINE PARK

By Lauren Cahoon Roberts

“THE EQUINE PARK TRULY REPRESENTS A COMBINATION OF TEACHING, RESEARCH, AND SERVICE THAT IS QUITE UNIQUE. IT REALLY SETS OUR INSTITUTION APART AS A VETERINARY COLLEGE.”

— DR. LISA FORTIER

THEN AND NOW: DR. JOHN E. LOWE AND A STUDENT EXAMINE A HORSE IN 1974; CURRENT-DAY DVM STUDENTS TEND TO A PARK HORSE.

At first glance, it looks like any large horse farm—expansive pastures, a stately barn, a white farmhouse. Yet the Cornell Equine Park is much more than a pretty place. This 'hidden gem' of the College has helped develop some of the most clinically useful drugs on the market; produced world-class sport horses; served as a federal quarantine facility; enabled life-enhancing discoveries; and trained future and current top clinicians and researchers. "The Equine Park truly represents a combination of teaching, research, and service that is quite unique," says Park Faculty Director Dr. Lisa Fortier. "It really sets our institution apart as a veterinary college."

From cow barn to quarantine facility

The Park started in 1974 as a research facility for equine nutrition, drug testing, reproduction, and infectious disease. Originally a dairy farm, the main barn required significant remodeling to make it suitable for horses. Dr. Jack Lowe, professor emeritus of large animal surgery and former director of the Park, recalls personally jack-hammering the cement milking stanchions to get the facility ready, along with a team of willing students and employees. Their first herd of horses came from a wealthy donor, Dwight Winkelman of Skaneateles, N.Y. "He gave us a good stallion and twenty mares," says Lowe, "and it grew from there—people continued to donate their horses. This made the Park a great place for equine research, and a great place for teaching too."

Lowe also arranged for the Park to be a quarantine facility for contagious equine metritis (CEM), a serious and highly transmissible venereal disease in horses. For decades, thanks in part to its closeness to the Animal Health Diagnostic Center, Cornell had the only equine metritis quarantine facility in the Northeast; all horses of breeding age entering the country from Europe and Japan through this region had to first stay at the Park for screening. In its heyday, the CEM facility saw 2,000 mares and 150 stallions.

Revolutionary research

Park-based discoveries have fundamentally changed equine health and husbandry; groundbreaking nutritional research conducted by Lowe, Dr. Harold F. Hintz, professor of animal science, and Dr. Herbert Schryver, professor of veterinary nutrition, resulted in equine nutritional requirements now used by the USDA and vast improvements in equine health. "In the past, we considered a twenty-year-old horse as really old," says Fortier. "Now, we consider thirty-five years to be old. And the reason for that, primarily, is greater understanding of equine nutrition—understanding that was primarily developed here at the Park." The Park was also the home to the development of all new diagnostics for equine post-race drug testing in New York State, and was the site of testing some of the most commonplace equine drugs on the market today, including the anti-inflammatory drug flunixin, and the sedative analgesics xylazine and detomidine. "After testing detomidine at the Park, I was sure every equine practitioner would have this drug in their grip," says Lowe.

Beyond foundational drug discoveries, the Park hosted the research of Dr. Katherine Houpt, James Law Professor of Behavior Medicine, emeritus, which outlined key aspects of horse behavior, including mare-foal relationships, stallion behavior, and best practices in feeding and equine welfare.

Dr. Soon Hon Cheong, assistant professor of theriogenology, currently studies horse reproduction at the Park. He's perfecting the use of oxytocin to advance labor in Park mares that are ready to foal, thus ensuring students and residents are present to observe foaling and learn how to assist if necessary. The theriogenology group has also been working on evaluating drugs for delaying ovulation without reducing fertility—a potentially useful tool for the horse breeding industry.

Horses are not the only species that benefit from Park research—some findings have applications in human medicine

as well: Fortier has conducted her innovative work on regenerative medicine in musculoskeletal disease, including work on mesenchymal stem cells for treatment of inflammatory diseases and bone marrow concentrate for cartilage repair. "We at the College have really led the way in a lot of the regenerative medicines that are applied to humans and animals (including horses and dogs) through work that we've done at the Park," she says. Fortier notes that the all research conducted at the Park is non-invasive. "Sometimes, owners who are considering donating their horse to the Park are worried about what the term 'research' implies," says Fortier. "It's nothing more invasive than blood draws," she says. "The horse's health is never put in jeopardy."

Horses teaching humans

While the Park is undoubtedly a home for groundbreaking research, there's another mission that takes top-billing: training the next generation of equine experts. "The whole purpose of having these horses, ultimately, is for teaching," says Cheong. Veterinary students do not palpate any of the client-owned horses that routinely stay at the Park due to the liability of potentially causing rectal tears—thus, Park-owned animals are necessary. "Our herd mostly comes from donations," says Alexa Fland, animal technician at the Park. "People will donate a beloved horse that, because of an injury, they can no longer ride. One horse has a bad spine—he can't be ridden, but for a teaching horse, he's wonderful." Other horses may have a bad neck or knee, and each become a useful teaching tool for students who need to learn to examine and diagnose equine patients. "The availability of these Cornell-owned horses is really advantageous," says Cheong. "It creates an invaluable learning experience for our students." He explains that students get to practice ultrasounds, inseminations, palpations and other key clinical skills for equine medicine.

"THE EQUINE PARK IS A REAL OPERATING FARM; STUDENTS SEE THE SAME SITUATIONS THAT YOU WOULD WORKING AS AN EQUINE PRACTITIONER. IT'S VERY MUCH AN ON-THE-FARM EXPERIENCE."
—CAROL COLLYER

It's not just the horses themselves that are teaching tools—the entire facility is a learning lab. "At other schools you may have a small barn for horses," notes former Barn Manager Carol Collyer. "But the Equine Park is a real operating farm; students see the same situations that you would working as an equine practitioner. It's very much an on-the-farm experience." Indeed, the entire package of 165 acres of green pastures, 62-stall main barn, stallion and broodmare barns, all less than two miles away from the College, is an unusual resource for a veterinary school. "It's a huge, huge asset," Collyer adds. "Students are learning a well-rounded aspect of horse-care management and veterinary care all rolled into one."

Not only that, students can immerse themselves fully into the world of a working horse farm by boarding at the on-site farmhouse at the Park. Students will take shifts on 'foal watch' during the spring and early winter, muck stalls, turn out and feed horses. Lauren Jacobs, a second-year veterinary student, is a Park farmhouse resident and enjoys the farm life. "It's peaceful compared to the bustle of campus. I also enjoy having

SEACOAST WONDERFUL IS ONE OF SEVERAL STANDING STALLIONS AT THE CORNELL EQUINE PARK. AS BOTH A SUCCESSFUL WARMBLOOD STALLION AND A TEACHING HORSE, SEACOAST IS A PRIME EXAMPLE OF THE MANY ROLES A PARK HORSE PLAYS.

an outlet to interact with animals whenever I need a study break," she says. She's also appreciated the chance to bond with Park horses, including Strauss, one of the Park foals born last year. "He was a big boy, but very friendly like his mellow-tempered mother," recalls Jacobs. "This fall I was bringing the horses in during afternoon chores and called to Strauss--and he actually came when called. I have been delighted with the chance to work with such pleasant horses and hope to continue to do so."

Learning with purpose

Beyond the basics, the Equine Park is a perfect learning lab for theriogenology. Students have access to the entire reproduction cycle. "At other schools, students might get to see just one phase of the breeding cycle," says Fortier. "At Cornell, students can follow a horse through breeding, pregnancy, foaling, and post-pregnancy breeding." And, while the purpose of the breeding program is first and foremost educational, it developed a reputation for producing high-quality Warmblood horses under Barn Manager Collyer's management in the late 1980's. That reputation has become something of a mission at the Park since then. "It's a philosophy of this place—if we're going to produce foals, they're going to be high-quality," says Fortier. "We want to give these horses a chance at a useful life," adds Cheong.

Today, authorities from different Warmblood breed associations come to the Park each year to evaluate the latest crop of foals for registration and breed requirements. In spring 2016, all Park-born-and-bred foals evaluated by the Oldenberg Breeders' Association were given a 'premium' rating, and two of the foals received a 'foal of distinction' grade—high marks indicating a truly promising group of youngsters. "Our foals do tend to get high marks," says Fland, "But this year in particular we saw a really good crop of babies."

PHOTOS THIS PAGE LAUREN ROBERTS

AN OLDENBURG HORSE BREEDERS' SOCIETY OFFICIAL INSPECTS A PARK FOAL.

The missions and focus of the Cornell Equine Park have changed over its thirty-plus year existence, and it's likely that they will continue to change as priorities at the College, state, and country shift over time. However, there is one element that will undoubtedly remain a constant in the future, as it has in the past: The Park horses will continue their role as teaching animals. "The horses are really the teachers here, more so than the people," says Fortier. "Everything that they do at the Park fulfills a teaching mission. They help train DVM students no matter which branch of veterinary medicine they decide to pursue." Lowe agrees, who, after founding the Park and seeing it grow and change through the years, believes its horses will remain a beloved fixture at Cornell. "The horses are an irreplaceable resource, and a strength," he says. "No matter whom you ask."

PHOTO JOURNAL: FEZ, MOR'OCCO

FIVE WEEKS AT A CHARITABLE VETERINARY HOSPITAL THROUGH THE LENS OF GABRIELLE WOO '17

This fall, I spent five weeks at the American Fondouk, a charitable veterinary hospital for working equids in Fez, Morocco. Animals such as donkeys, mules and horses are often used for transportation and agricultural work in poorer sections of Fez as well as the surrounding countryside, and usually do not receive regular farrier or veterinary care apart from visits to the Fondouk.

My trip was funded by the Expanding Horizons International Experience Program, which provides grants for current Cornell veterinary students to pursue clinical and research opportunities in developing nations.

View from top of the stairs in a Medina restaurant

JENNET CHAN

Gabrielle Woo '17 suturing skin pinch graft sites on a mule with chronic wounds.

Most of my time at the Fondouk was spent working up new cases and doing daily treatments for in-patients, as well as overnight shifts for patient monitoring and occasional emergencies. Our caseload included colics, traumatic injuries and lacerations, lameness, esophageal obstructions, dental problems, and infectious diseases such as tetanus and equine piroplasmosis. We also performed basic surgeries such as castrations, wound repairs and sarcoid removals under injectable general anesthesia in the Fondouk's small, but well-equipped, surgical suite. In addition to clinical work, I collected data for a survey study of chronic pressure wounds in horses, mules and donkeys. These animals frequently wear ill-fitted packs and harnesses to transport heavy loads around the city, and serve as major sources of income for many workers in Fez. Treating these patients was frustrating, because I knew the wounds would likely return once these animals went back to work. At the same time, I recognized that my patients' owners cared deeply about their animals' well-being, but also needed them to work in order to support themselves and their families.

Dr. Khadija el Abkari examines an unexpected visitor (Moroccan tortoise). A henna-painted miniature pony arrives for treatment of colitis. University of Glasgow veterinary student Aaron Tay monitors anesthesia during a wound repair surgery. Julie McAinsh, a University of Glasgow veterinary student, says hello to one of the many Fondouk cats.

While there were no simple solutions for these problems, we often kept these patients at the Fondouk for weeks or even months at a time for long-term medical management and monitoring. Upon their release from the hospital, we worked closely with their owners to facilitate a slow, gradual return to normal activities. At times we also modified and added padding to the packs the animals carried in order to decrease the likelihood of future pressure sores. In cases where hospitalization was not possible, such as in households that only owned one donkey or mule, we encouraged owners to return to the Fondouk on a weekly out-patient basis so we could continue treating wounds and other medical problems. This experience showed me the importance of communicating and working alongside owners to achieve the best possible standard of veterinary care, despite limited time and resources. This was also one of many examples at the Fondouk where I could appreciate direct, tangible links between veterinary medicine and human health.

One of the things I enjoyed most about this trip was the sheer diversity I saw in my group of colleagues. In just five weeks I lived and worked with veterinarians, technicians and students from the United Kingdom, the United States, Spain, Poland, Hong Kong, Taiwan, as well as Morocco. I loved how easy it was to discuss cases together and come up with diagnostic and treatment plans for our patients, despite differences in culture and language. Because students and interns all lived on-site at the Fondouk, some of my favorite memories outside of the clinic stem from entertaining conversations about our own cultures and ethnic foods, often while sharing home-cooked Moroccan meals such as couscous, tagines, breakfast pastries and sweet mint tea.

University of Glasgow veterinary student and equine dentist Justin Christensen performs an oral exam on a sedated mule.

JENNET CHAN

Gabrielle Woo with "Annie", a young donkey with equine piroplasmosis. Dr. Sara Amraoui (foreground) and Dr. Khadija el Abkari, American Fondouk interns.

Sunset over le Rocher d'Akechmir near Azrou, Morocco.

Despite long working hours, we still found time for adventures in the Medina in Fez as well as a few surrounding towns. I particularly enjoyed practicing speaking French with my Moroccan friends and locals I met while exploring the city, as well as taking photos of the desert landscape and busy marketplaces.

My time in Fez not only increased my confidence and clinical skills as a future doctor, but has given me lasting friendships and an appreciation for the unique joys and challenges of veterinary medicine in an international context.

Gabrielle Woo

"THERE HAVE BEEN SOMEWHAT DRAMATIC RESPONSES WITH THESE KINDS OF THERAPIES. THE PROBLEM IS THAT IN MOST CANCER TYPES THEY WORK LESS THAN TWENTY PERCENT OF THE TIME. WE WANT TO FIGURE OUT WHY IT ONLY WORKS FOR A MINORITY OF PATIENTS."

—DR. KRISTY RICHARDS

DRS. KELLY HUME AND VINCENT BALDANZA EXAMINE A CANINE LYMPHOMA PATIENT.

CANINES ON THE CUTTING-EDGE OF CANCER RESEARCH

By Lauren Roberts

We already know that dogs benefit humans—at Cornell, our canine companions' impact will be going even farther. Human oncologist Dr. Kristy Richards and veterinary oncologists Dr. Angela McCleary-Wheeler and Dr. Kelly Hume are recruiting for a canine study that represents the first step in developing novel therapies to treat both canine and human lymphoma patients.

The study focuses on the development of immunotherapy—a new and promising approach to treating cancer that co-opts the body's own immune system to attack malignant cells. A specific example of this type of immunotherapy is the PD-1/PD-L1 system, known as a checkpoint inhibitor approach—therapeutic antibodies block the protein-receptor interaction between immune cells and cancer cells, removing a natural safety brake, so that immune cells will then attack, rather than ignore, the offending cancer cell. "There have been somewhat dramatic responses with these kinds of therapies," says Richards. "The problem is that in most cancer types they work less than twenty percent of the time. We want to figure out why it only works for a minority of patients."

Their goal, in partnership with Roswell Park Cancer Institute in Buffalo, N.Y., will be to first characterize all the mutations within dogs' lymphoma cells to see which ones result in protein changes. Patients with more of these protein changes are thought to respond better to PD-1/PD-L1 therapies. Once these protein changes are identified, the team will work to isolate, and then genetically re-create T-cells that recognize these offending proteins and attack the cancer cells within the patient.

Recently, policy makers and scientists have recognized that dogs represent an ideal study population for research on immunotherapy targets. More efficient than human clinical trials, and more accurate and sophisticated than mouse trials—dogs represent a powerful tool for developing more effective cancer therapies. Thus, the CVM/Roswell team has received a supplement grant from the National Cancer Institute to begin recruiting canine patients for immunotherapy research that will will benefit both people and dogs. "Currently, many of the available

DR. KRISTY RICHARDS

immunotherapies are non-specific, meaning patients' immune systems will attack healthy cells as well as cancer cells," says Hume. "We'd like to restrict them to attacking just the cancer cells so patients will have better outcomes and quality of life."

The first step for the researchers will be to collect lymph node samples from 25 canine lymphoma patients in an effort to learn how to identify which mutated proteins make the best immunotherapy targets. "Our hope is to narrow the search for a therapy," says Hume. In return, all canine lymphoma patients will receive free comprehensive diagnostic evaluations and expert advice regarding prognosis and treatment. Dog owners will have the added benefit of contributing to research that may very well yield real treatments for dogs with lymphoma in just a few short years.

The ultimate goal of the research project is to develop "a high-impact translational project that combines our expertise with the Roswell Park Cancer Institute," says Richards. "Our research will provide a deep, comprehensive understanding of mutational load and immune response in canine B-cell lymphoma. This will enable immediate development of a cancer-specific, novel T-cell-based therapy that may work synergistically with PD-1/PD-L1 checkpoint inhibition to improve response rates and survival times."

FAST, EFFICIENT SPERM TAILS INSPIRE NANOBIOTECHNOLOGY

By Merry Buckley

Just like workers in a factory, enzymes can create a final product more efficiently if they are stuck together in one place and pass the raw material from enzyme-to-enzyme, assembly-line style. Scientists at the Baker Institute for Animal Health have done just that by recreating a complex biological pathway with all the enzymes tethered to nanoparticles. Their inspiration? Sperm tails, which have enzymes that turn sugar into lactate and energy so quickly that sperm can speed along at five body-lengths per second.

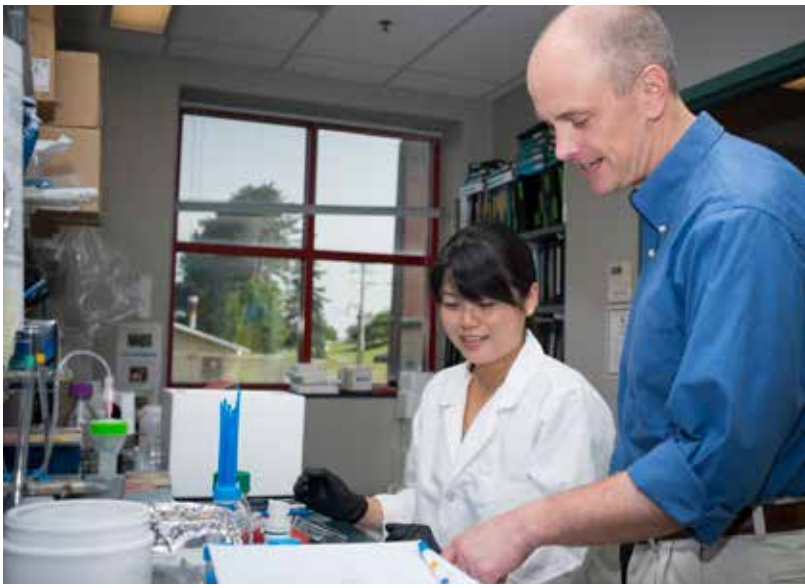
"Sperm have a highly efficient energy-producing system," says the study's lead author, Dr. Chinatsu Mukai, a postdoctoral research associate in Dr. Alex Travis's laboratory at the Baker Institute. Mukai and others had been studying animal reproduction and sperm function when Travis had the idea to mimic the way sperm tail enzymes are attached to a solid support in an attempt to achieve the same sort of efficiency on small man-made devices.

In most cells, the majority of enzymes that carry out the process of turning sugar into energy, called glycolysis, are floating around, taking up their substrate as it happens along. But in sperm, the enzymes that carry out glycolysis are attached to a solid protein scaffold that lies just beneath the cell membrane and runs down most of the length of the tail. "Sugar comes in through the membrane, hits the enzymes immediately underneath, and then is processed and passed down the line, giving energy production in a high-throughput fashion," says Travis.

The system Mukai, Travis, and their team developed works in much the same way: the sugar molecule is processed from start to finish, in a 10-step process, by enzymes attached to nanoparticles.

When compared with enzymes floating free in solution, the tethered-enzyme system processed glucose to the end product, lactate, more efficiently, leaving lower concentrations of intermediate products than the free-floating enzyme system. Getting a 10-step pathway to function with all the components tethered is an exponential increase over previous studies, which reported a maximum of 2-3 steps in tethered enzyme systems.

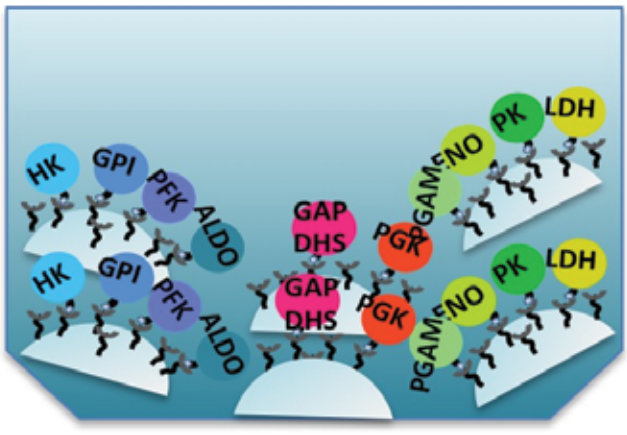
If the work can be enhanced to be a net producer of energy, there could be a number of practical applications, says Travis. In sperm, the energy is used for swimming and the signaling that allows it to fertilize an egg, but in nanobiotechnology, the energy could be used to power devices that carry out a variety of jobs.



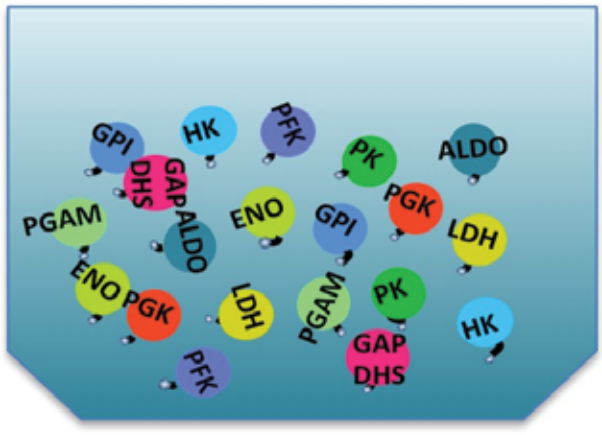
DR. CHINATSU MUKAI WITH DR. ALEX TRAVIS. © RACHEL PHILIPSON

"Imagine devices the size of blood cells, each holding a chemotherapy drug. If outfitted with this kind of engine, then the devices could make their own energy from sugar in the bloodstream. Using molecular pumps powered by that energy, the devices could kick out that drug cargo at defined rates, and specifically where it's needed, such as at the site of a solid tumor" says Travis. His team has already applied the concept of tethered enzymes in a device to detect signs of stroke or traumatic brain injury in blood samples, a technology that he and his lab are planning to commercialize.

It may even represent a step closer to realizing the potential of artificial cells, says Mukai. "You can't make an artificial cell without metabolic pathways, so this is progress in that direction," she says.



TETHERED ENZYME SYSTEM



FREE-FLOATING ENZYMES

"IN SCIENCE, IT'S NOT UNUSUAL FOR YOUR INITIAL HYPOTHESIS TO BE WRONG, BUT WE JUST DIDN'T GIVE UP—AND AS A RESULT WE MADE THIS EXCITING DISCOVERY ON THE ACTIVATION OF NEONATAL B CELL MEMORY."

—DR. BETTINA WAGNER

DR. BETTINA WAGNER AND TWO OF HER ICELANDIC HORSES.

LAUREN ROBERTS

OF VACCINES AND VIKING STEEDS:

WAGNER DISCOVERS NOVEL APPROACH TO INDUCE IMMUNITY IN NEWBORN FOALS

By Lauren Cahoon Roberts

Developing effective vaccines for newborn foals has been frustratingly elusive; the neonate immune system is thought to be underdeveloped and thus unresponsive to traditional vaccination methods. However, thanks to some creative thinking, dogged persistence—and a herd of adorable Icelandic horses—the stage has been set for developing the first effective vaccine for newborn equines. In research funded by the Harry M. Zweig Memorial Fund for Equine Research, and published in the January 2017 issue of PloS One, Dr. Bettina Wagner, professor of immunology and associate dean for research and graduate education, along with her CVM colleagues, triggered partial protection and an increased antibody response against equine herpes virus-1 (EHV-1), a highly prevalent pathogen that can induce life-threatening equine disease.

Happy accident

Wagner made the first step of this discovery by accident—in fact, it started as an unwelcome data point. Wagner had been measuring immune-modulating markers, so-called 'cytokines', in immune cells of newborn foals for a different study, assuming that, with their unformed immune systems, none would be present. However, in some five-day-old foals, she detected the cytokine IL-4. "I didn't expect to see this—and at the time, I didn't want to see it," Wagner laughs. "It destroyed my experiment—so it took me a couple of days to get into the mindset and acknowledge that something unusual was there."

With the new shift in thinking, Wagner set out to discover why those immune markers were made early in the foal's life. "I thought, if this happens consistently in foals there must be a reason," says Wagner. She decided to use this mysterious mechanism to drive neonatal vaccinations.

Vaccinating Viking-steeds

In order to test this out, Wagner needed an equine population that was certain to be EHV-1-free. For this, she turned to her herd of Icelandic horses. This breed, considered one of the world's purest, originated from animals brought over to Iceland by the Vikings, and evolved free from many of the diseases and pathogens that exist elsewhere. Wagner imported these horses in 2012 and established a herd in Ithaca for her immunology research.

When the new foals were born, Wagner's team gave them a EHV-1 vaccine designed to activate the IL-4 cytokine (that she had originally observed in five-day-old foals) to induce immunity against the virus. Unexpectedly, this initial vaccination failed to yield any detectable antibodies against the disease.

The next step was to test the foal's immunity again seven months later during weaning—a high-stress period for foals that often results in EHV-1 susceptibility. The researchers exposed the foals to the virus—and once again, the clinical outcome was less exciting than expected. "All the foals got sick," Wagner says. "There was only partial protection from the vaccine we gave them as newborns." The vaccinated foals had a slightly lower fever, but no other clinical difference.

Despite the lackluster response, Wagner persisted—she collected blood samples to examine the antibody response. "That's when it really became interesting," she says. "There was a very clear and dramatic difference between the foals that were vaccinated and controls. Vaccinated foals had a much earlier and higher antibody responses."

Why would the foals fail to show antibody production when first vaccinated, but show a dramatic response seven months later? Wagner believes that the early vaccination triggered the foals' innate immune system by creating memory B cells specific to the EHV-1 antibody. These long-lived immune cells do not create antibodies initially, but will do so when challenged later with the same virus.

The next step for Wagner and her colleagues is to further improve this vaccination method so that it provides clinical protection and an antibody response that occurs directly after vaccination. Their approach will be to target a broader array of immunologic pathways in addition to innate-driven IL-4 response.

For Wagner, the study is an exciting culmination of several hurdles, one of which is her herd of Icelandic horses. "When I first proposed the idea of using them as a research model, most people said it was a crazy idea and would never work," she says. Now, this group of roan, chestnut, and piebald equines is a unique and valuable research asset to the College. What's more, after the horses complete their scientific career, they are quickly adopted out as successful pleasure and sport horses. Additionally, Wagner notes the importance of scientific persistence. "In science, it's not unusual for your initial hypothesis to be wrong," she says. "But we just didn't give up—and as a result we made this exciting discovery on the activation of neonatal B cell memory."

THE GIFT OF HOPE: VETS AND DONOR TEAM UP TO SAVE PUP

By Lauren Cahoon Roberts

DR. GALINA HAYES AND DR. BLAKE TRAVIS, SENIOR SURGICAL RESIDENT, PLAY WITH JIM.

Jim is your classic black Labrador puppy: adorable, wriggly, with "Adopt Me!" written all over him. Yet he began life with a congenital heart defect that prevented him from getting adopted and threatened his life. Thanks to a veterinary practice that wouldn't give up on him; a gift from a donor's charitable foundation; and a world-class clinical team at the Cornell University Hospital for Animals (CUHA), Jim is growing and thriving with his new family.

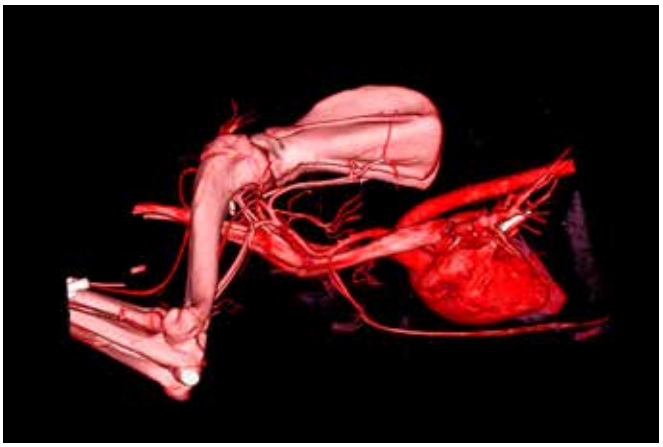
PUP WITH PROBLEMS

Jim was first brought as a six-week-old pup to Hoosick Veterinary Clinic in Hoosick, N.Y. His owners said that the pup was vomiting after eating. The Hoosick veterinarians ran a barium study, which revealed an enlarged area of Jim's esophagus—indicating that his food was being blocked from reaching his stomach. Hoosick veterinarian Dr. Caitlin Rooney and her team suspected the cause was a congenital heart issue in which a remnant blood vessel at the base of the heart lassos and traps the esophagus.

Unfortunately, fixing that congenital issue required an expensive surgery at a higher-level hospital—and until then, Jim would require constant feeding with a liquid diet, making his daily care quite burdensome. As a result, Jim's owners surrendered him to the Hoosick Veterinary Clinic. "This doesn't happen often," explains Rooney, "but he had a condition that could be fixed, and we knew he'd have no problem finding a home after that."

CONNECTING THE DOTS

In the meantime, Rooney and her colleagues called different veterinary hospitals to see if they would consider doing the heart surgery for a marked-down fee, as their practice could only cover a fraction of the cost. CUHA's Dr. Galina Hayes, assistant professor of small animal surgery, heard Jim's story and wanted to help. She reached out to Alison Smith, major gift officer at the College, hoping she might have an idea of how to cover the funds for the procedure. Luckily, Smith knew of just the person to help Jim.



COMPUTED TOMOGRAPHIC 3D RECONSTRUCTION OF JIM'S HEART AND SURROUNDING STRUCTURES.

The Richard Lichter Charity for Dogs (RLDC) foundation is a 501c(3) set up to provide hope and assistance for dogs. In addition to funding specialty medical treatment for shelter dogs, the RLCD also supports canine lymphoma and leukemia research.

To learn more, visit the organization's Facebook page at: http://bit.ly/2lkF5GS

TOP: RICHARD LICHTER SITS WITH HARLEY, A DOG WHOSE CANCER TREATMENT WAS FUNDED BY LICHTER'S CHARITY.
BOTTOM: PLUTO THE PIT PUPPY AND FALLON THE MASTIFF MIX HAVE ALSO BEEN SAVED THANKS TO LICHTER'S PHILANTHROPY.

AN EXCEPTIONAL CASE

Richard Lichter loves dogs. His charitable foundation, Richard Lichter Charity for Dogs, supports multiple causes for canines, including an extensive program for shelter dogs. "Shelter dogs generally have hope for a better life, for love and for a family," says Lichter. "However, some shelter dogs don't even have hope because shelters, due to lack of resources, need to euthanize many animals with treatable conditions. My foundation was set up to be the ultimate safety net." The foundation has funded care for over 100 shelter dogs through Penn Vet's Ryan Hospital and the Pennsylvania SPCA. This past October, the foundation was over budget and Lichter had decided not to initiate any new programs in 2016. Then he got Smith's call. "When I heard Jim's story and I saw an innocent life that was about to be ended due to an unfortunate but treatable birth defect, I thought—this really gets to the heart of what our mission is," says Lichter. "So an exception was made for Jim—he was a perfect recipient of a second chance for life."

A CULMINATION OF EXPERTISE

With funding in place from Lichter, Rooney took Jim to CUHA, where he had a full CT angiogram to get a 3D image of his heart. "This is a very specialized CT scan," says Hayes. "It's so comprehensive a roadmap that I barely have to do any dissection during the surgery—I already know what's there from viewing the angiogram." As the Hoosick Veterinary Clinic team had suspected, Jim suffered from a condition known as a persistent right aortic arch, in which a malformed heart ligament loops over the base of the heart, pinching the esophagus.

"THIS WAS NOT A ROUTINE CASE—IT REALLY REQUIRES MULTIPLE SPECIALTIES TO WORK TOGETHER... THE COORDINATION OF ALL THESE COMPONENTS IS WHAT ULTIMATELY RESULTS IN GOOD SURGICAL OUTCOMES."
—DR. GALINA HAYES

To fix the issue, Hayes and her team performed a 45-minute thoracic surgery to snip the offending ligament and free the esophagus. Rooney came in to observe the procedure. "That was probably the coolest surgery I've ever seen," she says.

The procedure is a culmination of many kinds of expertise: "This was not a routine case—it really requires multiple specialties to work together," says Hayes. "We needed anesthesiology to do a specialized block on his chest; we needed radiology to do the CT angiogram; we needed our surgical techs who have scrubbed in to thousands of surgeries and know exactly what kind of tool to hand you at exactly the right time. The coordination of all of these components is what ultimately results in good surgical outcomes."

JIM CUDDLES WITH HIS NEW ADOPTIVE PARENTS, AIRLEY AND ED ROONEY.

"IT CAN BE A TERRIBLE THING WHEN YOU'VE BEEN TRAINED TO SAVE AN ANIMAL'S LIFE, BUT YOU CAN'T DO IT SIMPLY BECAUSE THE FINANCING ISN'T THERE. MY GOAL IS TO CREATE PARTNERSHIPS TO SAVE THESE DOGS LIVES. WE PROVIDE FINANCING, BUT WE ALSO NEED OUR VETERINARIAN PARTNERS TO MAKE IT ALL HAPPEN."

—RICHARD LICHTER

LIFE-SAVING PARTNERSHIPS

Jim recovered well from the surgery. After taking him back to Hoosick Falls, Rooney and rest of the team slowly graduated him from a liquid diet onto solid food. "He did wonderfully," she says. Best of all, Jim found his forever home—with Rooney's brother and sister-in-law—where he's been living life as a normal, healthy puppy.

For Rooney, it's been a heartwarming journey. "The biggest impact about this story for me was how caring veterinarians are," she says. "It wouldn't have happened without everyone putting effort into it."

Lichter loves that his charity has made Jim's journey possible, noting how the lifesaving care is just as much a gift to the clinicians as it is to the dogs. "It can be a terrible thing when you've been trained to save an animal's life, but you can't do it simply because the financing isn't there. My goal is to create partnerships to save these dogs lives," he says. "We provide financing, but we also need our veterinarian partners to make it all happen."

SPECIALTY SPOTLIGHT: DENTISTRY AND ORAL SURGERY SERVICE

By Lauren Cahoon Roberts

“THE MOUTH IS THE LOCATION OF THE WORK, BUT EVERYTHING WE DO HAS A SYSTEMIC BEARING.”

—DR. NADINE FIANI

DR. NADINE FIANI AND DR. SANTIAGO PERALTA EXAMINE THEIR TOOLS.

A decade ago, pet dental care didn't go much further than a quick scale and polish followed by tossing Fido the occasional dental chew bone. Beyond that, dental and oral disease was left mostly untreated in our animal companions. Times have changed—spending on pet dental conditions has risen by over 55% in recent years, signifying a new awareness and demand for pet dental care.

The Cornell University Hospital for Animals (CUHA) heads this rapidly growing field as one of only five well-established academic programs in the world to offer dentistry and oral surgery training under board-certified experts. Their expertise is in high demand—the service is booked up two months in advance, continuing education courses sell out almost instantly, and DVM students are lining up for a spot on the service's clinical rotation and elective course. "It's only until recently that veterinarians have realized how necessary this service is," says Assistant Clinical Professor Dr. Nadine Fiani. "And now we're seeing huge demand from both them and our clients."

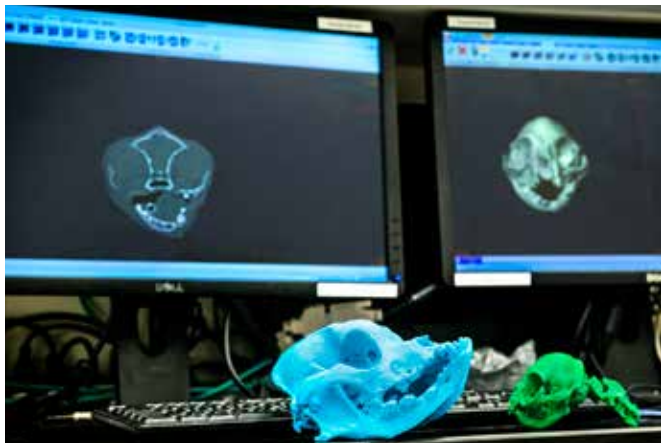
In demand

Fiani and Dr. Santiago Peralta lead the team in the small animal hospital, along with resident Dr. Kevin K. Ng and veterinary technicians Kalli Anderson and Bethany Wright. Dr. Edward Earley oversees dentistry and oral surgery for the large animal patients. "Five years ago it was two of us—a tech and a clinician," says Peralta. The administration saw the demand for more dentistry and oral surgery expertise, and enabled the service to expand to its current size, with plans to add on another full-time resident soon. "That has allowed us to expand our caseload, which has grown by one-hundred-and-eighteen percent."

That growth reflects the increasing awareness that dental and oral care is a key part of animal care. "More and more, referring veterinarians are realizing how necessary this service is," says Peralta. "Client education has also driven the demand—pet owners start to see that their pet might not be getting the same level of dental and oral care they are—and that pushes the need in the veterinary industry."

Beyond brushing teeth

While owners want more dental care for their pets, they might not realize the full extent of the service's capabilities. "People tend to think that we clean teeth all day," says Fiani. "That is not really what we do—we screen for and comprehensively treat dental diseases when detected." Additionally, the team handles any trauma injury to the head, as well as any cancer of the oral cavity, conducting surgeries when needed. They also routinely adjust bite alignment, perform root canal treatments, treat periodontal disease, and repair cleft palates or other maxillofacial malformations. In fact, the Cornell service has become world-renowned for their work in cleft palate repair. "We probably operate on more cleft palates than any other medical team in the world," says Fiani. These repairs require sophisticated surgery to close the tissue of the palate—on patients that can weigh less than half a pound. These repairs save animals from an early death due to pneumonia, and restore function and quality of life. Like all of the service's clinical care, "The mouth is the location of the work, but everything we do has a systemic bearing," Fiani says.




CLOCKWISE FROM LOWER LEFT: RESIDENT DR. KEVIN NG DISCUSSES A CASE WITH COLLEAGUES. A 3D-PRINTED SKULL SITS IN FRONT OF CT SCAN IMAGES. DR. NG TAKES CLINICAL PHOTOS OF A PATIENT. REAL AND MODEL SKULLS, USED FOR REFERENCE AND TEACHING.

Sophisticated service

Inside the Dentistry and Oral Surgery service's clinical suite, the upper cabinets are lined with skulls of various species—many of which were 3D-printed by colleague Dr. Daniel Fletcher, associate professor of emergency and critical care. These skulls are used for planning and analysis for oral surgeries—along with the double monitors that often display a detailed 3D scan of the patient's skull. Surgeries are sometimes performed on very diminutive patients with even smaller mouths—that's when the service's state-of-the-art microscope comes in handy, allowing the clinician a magnified view of tiny oral structures.

This device, along with most of the equipment in the suite, are donations from generous clients. "The level of sophistication here is comparable to human counterparts," says Peralta. "A lot of what we do is taken from human medicine, but not everything gets translated the same way." He explains that for animal patients, all recommendations are based on function, since appearance is not a concern. Function, of course, is paramount, and this team is a world-leader in restoring animals with severe oral issues to normal, healthy lives.

Thought leaders

As their caseload and experience has grown, so has demand for the team's expertise. "The need for this capability is huge, but there is a void in education," says Peralta. Luckily, Cornell DVM students can rotate through the Dentistry and Oral Surgery service, where they're given lots of hands-on training. "Our students get to perform full-mouth intraoral radiographs, periodontal probing, ultrasonic scaling, and surgical tooth extractions. The students are heavily involved in interpreting the diagnostics and clinical decision-making," says Fiani, noting that each tooth represents a separate clinical determination. "I like to say that they have to make at least 42 decisions for a dog, or at least 30 decisions for a cat."

This level of clinical involvement and training has clear professional rewards for Cornell trainees. "Once one of our DVM students has rotated through our service, their level of knowledge and skill is way above the level of general practitioners in the country—just through some lectures and a couple of weeks on rotation. That's how big the void is—and general practitioners realize this." As Peralta and Fiani have trained more and more recent generations of veterinarians, many have stayed in the area and practiced the basic dentistry skills and knowledge they learned at Cornell, while referring more complicated cases back to their alma mater—thus deepening the CUHA team's knowledge of complex dental and oral disorders.

Additionally, in an effort to meet the growing demand for training among veterinarians, the Cornell team organized a three-day continuing education course on basic dentistry, which sold out immediately. Additionally, Fiani helped organize a first-of-its-kind conference, called 'Craniomaxillofacial disorders and solutions in man and animals', where Peralta presented his research on cleft lip and palate in dogs. "This initiative and the extensive collaborative work was performed between UC Davis, UCLA and Cornell," Fiani explains. "The meeting was very successful and we had attendees from a broad spectrum of disciplines related to the craniomaxillofacial field, such as veterinary and human clinicians, researchers, engineers, and cancer biologists. We also had participants and speakers from the FDA and industry."

Research and outreach

Thanks to the number of cleft palate repairs the group sees, they've been actively collecting scientific data regarding morphological aspects of the condition and the surgical outcome of the repair. Their other research projects include a collaboration with Dr. Angela McCleary-Wheeler, assistant professor of oncology, to look at a molecular mechanisms involved in a common and devastating oral tumor in dogs. Another study examines the role of bacteria in development of periodontitis in dogs and cats.

The group also takes their expertise beyond borders when they can. Recently, the group was part of a multidisciplinary team of CUHA clinicians, including Dr. George Kollias, Jay Hyman Professor of Wildlife Medicine, emeritus, and anesthesiologist Dr. Jordyn Boesch, that traveled to Belize to treat the largest population of rescued captive jaguars. Funded by the Weiderhold Foundation, the trip enabled Peralta and Fiani to treat jaguars, many of which have maxillofacial injuries from the event of their capture (traps, etc.) or dental disease. "The prevalence of diseases in the oral cavity is high for these animals," says Peralta. "They have a lot of problems we need to treat; treating endangered captive animals is crucial for individual animal welfare reasons but also for conservational purposes."

Fast-moving field

If the past few years are any indication, the Dentistry and Oral Surgery service is bound to expand—both in caseload and in knowledge. "I feel like the field has moved dramatically since I started in 2008," says Fiani. "Even over that relatively short period of time, the overall understanding has grown exponentially." In the near future, the service will hold more conferences, trainings and other educational outreach to help other practitioners adopt dentistry and oral surgery skills in their practices. The service will expand to accept more students for their rotation, and will continue their cutting-edge research and clinical care in the field. "It's been very exciting to personally witness the growth of this important and fascinating field," says Fiani. "We plan to continue to sharpen our clinical expertise, while expanding our research and educational outreach, so that more animals will have the dental and oral care they deserve."

BETHANY WRIGHT, LVT.

DR. SANTIAGO PERALTA PERFORMS ROOT CANAL TREATMENTS AND EXTRACTIONS ON A CAPTIVE JAGUAR AT THE BELIZE ZOO DURING THE SERVICE'S TRIP TO BELIZE IN JANUARY 2017.

Sheila Allen ’76 DVM ’81

New Steps in Leadership

By Sherrie Negrea

When Sheila Allen ’76 DVM ’81 became dean at the College of Veterinary Medicine at the University of Georgia in 2005, she had her work cut out for her. The college treated 17,000 patients a year at one of the smallest veterinary teaching hospitals in the country—an outdated facility that was difficult to access and didn’t have room to accommodate advanced diagnostic equipment or to train more veterinary students. “We just weren’t able to grow anymore,” Allen says.

After becoming dean, however, Allen spearheaded a project to build a $97 million new campus, including a teaching hospital, that opened two miles away from the main campus in 2015, offering advanced radiation therapy, new MRI and CT instruments for large and small animals, and underwater treadmills to provide physical therapy for small animals.

The completion of the new 300,000-square-foot, five-building hospital campus was one of several major goals Allen achieved during her tenure as dean. In December, Allen resigned from the position to become the senior accreditation advisor for the Association of American Veterinary Medical Colleges.

“I had been dean for eleven years, and I had accomplished my major goals,” Allen says. “Although there are always challenges in front of you, this opportunity to work for AAVMC with accreditation became available and I thought it was a good fit for me, so it was time.”

DR. SHEILA ALLEN AND HER DOG FLINT

WHITNEY MATHISEN

"I'VE DEVOTED MY ENTIRE CAREER TO VETERINARY EDUCATION, AND THAT'S ESSENTIALLY WHAT THIS ROLE IS ALL ABOUT—ENSURING HIGH QUALITY EDUCATION FOR VETERINARY STUDENTS."—DR. SHEILA ALLEN

Allen began her career at the University of Georgia because of the influence of two of her professors at Cornell—Drs. Susan Fubini and Nita Irby, who had both earned their veterinary degrees at the university. With her DVM from Cornell, where she had been a chemistry major as an undergraduate, Allen arrived at the University of George in 1981 to complete her internship in small animal medicine and surgery, followed by a small animal surgery residency.

While conducting research in oncology, Allen was encouraged by one of her mentors to pursue a master's degree in veterinary clinical pathology at the college. She became an assistant professor at the university in 1986 and was appointed associate dean for academic affairs in 1997.

When Allen became dean in 2005, she was the second woman in the country to lead a veterinary college—after Shirley Johnston, dean of the College of Veterinary Medicine at the Western University of Health Sciences in Pomona, Calif. Despite the significance of her appointment, Allen was primarily focused on the pressing issues she faced in her new role.

"I just felt a huge responsibility, and I was willing to accept the challenge at the time," Allen says. "Being one of the first women to become dean wasn't really a focus of mine."

In addition to constructing a larger teaching hospital, the college needed to advance its research enterprise, renovate its infectious disease research center, and build a larger endowment. Another critical issue was the underrepresentation of minorities both among the students and faculty at the school—the only veterinary college in Georgia.

Working with faculty, Allen was able to tackle these challenges one by one. With the expansion of the teaching hospital, the caseload grew from 17,000 to 27,000, and gross revenue rose from $9.0 million to $17.4 million a year. Construction soon began to build a new Center for Vaccines and Immunology in the vacated hospital space, at a price tag of nearly $10 million.

Research grants also increased—from $8 million to $24 million annually—during her tenure, mainly as a result of recruiting and retaining faculty with strong track records in research. "That was a very important goal that I set when I became dean," she says.

Another key accomplishment was doubling the percentages of underrepresented minorities in the student body to 18% and

DRS. STEVE WINOKUR, SHEILA ALLEN, AND SHERRY ALMAND

among the faculty to 21% to better reflect the state population. Allen credits that achievement to a team effort that included a full-time diversity officer who was hired to set up a variety of diversity programs for the college.

In her new position with the AAVMC, Allen will support the Council on Education in accrediting veterinary colleges throughout the world. "I've devoted my entire career to veterinary education, and that's essentially what this role is all about—ensuring high quality education for veterinary students," says Allen, who served as chair of the council from 2012–2013.

This won't be Allen's first time working at the national level. She has also served on the AVMA Council on Education, the Board of Directors of the AAVMC, and on a committee to assess veterinary workforce needs by the National Research Council of the National Academy of Sciences.

Allen is a past member of the Dean's Advisory Council for Cornell's College of Veterinary Medicine and plans to continue her work for Cornell, both as a member of University Council and the President's Council of Cornell Women. She will be one of six candidates on the ballot for Cornell's Board of Trustees, to be voted on in an election by the university's alumni this spring.

Although the AAVMC is based in Washington, Allen plans to work remotely from her home in Athens, where she lives with her husband, Douglas Allen, who is also a veterinarian, and her Australian shepherd Flint. Their two adult children live in Atlanta (Mark) and Charleston (Kelsey). "I've lived in Georgia since I graduated from Cornell in 1981," Allen says. "I love the state, and I love the people. While I have fond memories of Ithaca and a strong allegiance to Cornell, the southeast is home."

2017 ALUMNI TRUSTEE CANDIDATES:

For more information about Cornell's alumni trustee election, please visit http://alumni.cornell.edu/trustees/

DR. SHEILA WILSON ALLEN '76 (A&S), DVM '81
Athens, GA
Endorsed by the Committee on Alumni Trustee Nominations

JAY CARTER '71 (ENG), MEN '72
Hillsborough, NJ
Endorsed by the Committee on Alumni Trustee Nominations

LINDA COPMAN '83 (A&S)
Ithaca, NY
Unendorsed candidate; petitioned to be on ballot

LINDA GADSBY '88 (ILR)
South Orange, NJ
Endorsed by the Committee on Alumni Trustee Nominations

JOE ROWLAND '73 (CALS)
Binghamton, NY
Unendorsed candidate; petitioned to be on ballot

KENT SHENG '78 (A&S)
Woodcliff Lake, NJ
Endorsed by the Committee on Alumni Trustee Nominations

IN MEMORIAM

Since the Summer 2016 issue of 'Scopes, the College has been notified of the passing of the following:

Dr. Clarence McNeil "Neil" Burgher '58, January 10, 2017
Dr. Eva Conant '10, September 29, 2016
Dr. Daniel Duberman '52, November 14, 2016
Dr. Charles Duncan '45, February 14, 2016
Dr. John S. Kenney '61, August 27, 2016
Dr. Walter M. Klein '45, November 5, 2016
Dr. Arthur Knochenhauer '60, November 14, 2016
Dr. Jon D. Krause '73, June 2, 2016
Dr. Frank E. McClelland Jr. '40, December 29, 2016
Dr. John Rae Steele '46, February 24, 2017
Dr. Gerald M. Ward '49, February 1, 2016

CORRECTION:

Fall 2017 Annual Report issue, page 53, "Conservation Connections": we referred to a participating student incorrectly as Angie Rivera. The name should have read as Julian Rivera.

Clinic Memorial Giving Program

Remember your client's beloved pet with a contribution to one of our Memorial Giving Programs

College of Veterinary Medicine

Baker Institute for Animal Health

Cornell Feline Health Center

To make a donation, visit our website:
vet.cornell.edu/giving/ClinicMemorials.cfm

Or contact our Office of Alumni Affairs and Development
607-253-4310
petfriends@cornell.edu

Mark your calendar for Reunion on June 8–11, 2017.

Calling all DVM ALUMNI from classes ending in 2s and 7s:

Join your friends!

IT'S ABOUT REMEMBERING YOUR FIRST SURGERY. GETTING TO KNOW THE PEOPLE IN YOUR TUTOR GROUPS. ALL THOSE LATE NIGHT STUDY SESSIONS. READING TEXTBOOKS WRITTEN BY YOUR PROFESSORS, THEN READING THEM THREE MORE TIMES. GOING TO SCAVMA MEETINGS FOR THE FREE FOOD. TRYING TO REMEMBER EVERY DIFFERENTIAL DIAGNOSIS ON ROTATIONS. PANICKING ABOUT PASSING EXAMS. PUTTING ON YOUR WHITE COAT IN THE THIRD YEAR!

Enjoy the camaraderie of old friends and see new and old spaces at the veterinary college.

Find information on hotels, event schedule, and more at:
vet.cornell.edu/reunion.

REMEMBERING DEAN EMERITUS DONALD F. SMITH (1949–2016)

Dr. Donald F. Smith, Austin O. Hooey Dean Emeritus of the Cornell University College of Veterinary Medicine was the ninth dean of the College, serving from 1997 to 2007. A diplomate of the American College of Veterinary Surgeons, he was considered a foremost authority on bovine surgery. His research on metabolic alkalosis in ruminants was instrumental in advancing the field of metabolic diseases of cattle.

"We have been deeply saddened by his passing," said current Dean Lorin Warnick, citing Dean Smith's "many accomplishments as a clinician, faculty member and leader in the College.

"I am personally grateful for the support and encouragement Don gave me since I was hired as a faculty member, and especially recently while I was serving as Interim Dean," Warnick said.

Dean Smith oversaw the completion of 40,000 square feet of additional clinical instruction and research space at the College, as well as a substantial addition to the James A. Baker Institute for Animal Health.

Under his leadership, the Cornell University Hospital for Animals expanded in terms of specialty services and caseload and the New York State Animal Health Diagnostic Laboratory became a nationally-recognized regional center for bio-security related to animals and public health. Dean Smith led CVM through a reorganization in which academic departments were consolidated and renamed to reflect contemporary science and medicine. He also guided the development of a major comparative cancer program.

DEAN DONALD SMITH SPEAKS AT THE 2007 DVM HOODING CEREMONY

Steve Ettinger '62, DVM '64 described Dean Smith as "a very warm and engaging individual. He had a tremendous number of interests," including the practice and history of veterinary medicine and helping students advance in their studies and, ultimately, in their careers. "He loved the College and the work he did there," said Ettinger.

Dean Smith earned his DVM with distinction at the University of Guelph in Ontario, Canada in 1974 and completed an internship and residency in large animal surgery at the University of Pennsylvania. He first came to Cornell in 1977 as an assistant professor of surgery. He left for an associate professorship in large animal surgery at the University of Wisconsin-Madison, returning to Cornell in 1987 as Chair of the Department of Clinical Sciences. He also served as Associate Dean for Veterinary Education and Associate Dean for Academic Programs prior to becoming dean of the College.

"As a faculty surgeon Dr. Smith had uncanny abilities, especially when treating individual dairy cattle with surgical diseases," said Dr. Susan Fubini, professor of large animal surgery and associate dean for academic affairs. "His command of the anatomy was extraordinary. Every time I operated with him I learned something new. He mentored many young faculty and residents, championed the role of women in the profession and encouraged leadership opportunities for female students, staff, and faculty."

In the past year Dean Smith co-authored a book, Leaders of the Pack: Women and the Future of Veterinary Medicine and Pathways to Progress, a history of American veterinary colleges and schools.

Those wishing to make memorial donations in Dean Smith's name are asked to please consider the College of Veterinary Medicine at Cornell University, the Stroke Center at Cayuga Medical Center or Christ Chapel in Ithaca, NY.

DEAN DONALD SMITH AND DR. JOSEPH BERTONE EXAMINE A HOLSTEIN COW WITH ASSISTANCE FROM LARGE ANIMAL TECHNICIAN KEVIN BLECK.

Cornell University
College of Veterinary Medicine

Box 39
Ithaca, NY 14853

FEZ, MOROCCO THROUGH THE LENS OF GABRIELLE WOO (SEE PAGE 26)

FRIENDLY STREET KITTEN SEEN AT THE TRAIN STATION IN MEKNES, MOROCCO

GABRIELLE WOO