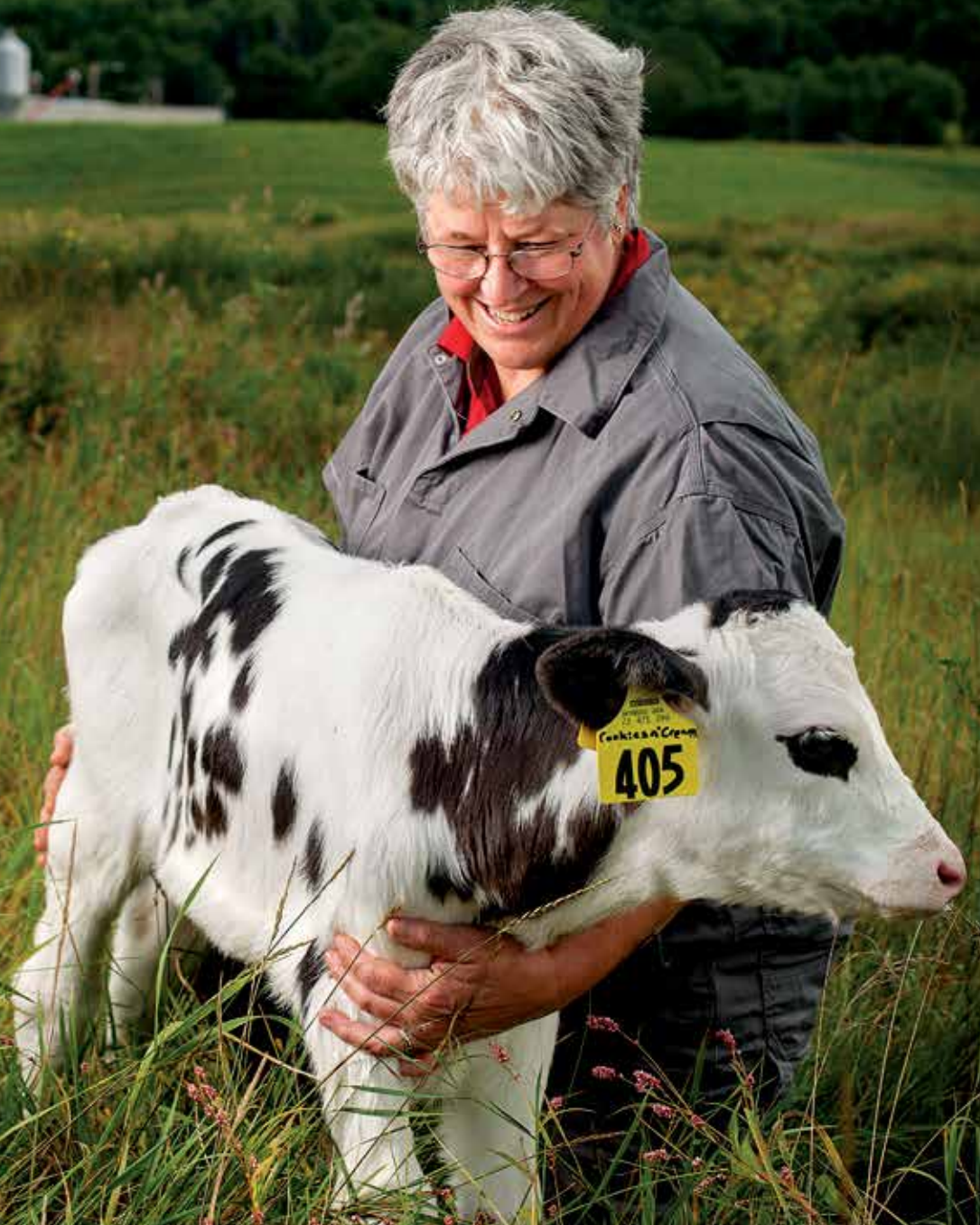


Cornell University
College of Veterinary Medicine

2013-2014 ANNUAL REPORT

'SCOPES

FROM STETHOSCOPES | TO MICROSCOPES | TO THE SCOPE OF THE COLLEGE FALL 2014



ONE HEALTH: INTRICATE CONNECTIONS BETWEEN
PEOPLE, ANIMALS, AND THE ENVIRONMENT

**Cornell University
College of Veterinary Medicine**

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On the cover: Dr. Belinda Thompson with five-day-old calf, Cookies and Cream, at the Animal Science Teaching and Research Barns.



Private company establishes the Catherine Violet Hubbard Scholarships for Shelter Medicine



Dr. Michael I. Kotlikoff,
Austin O. Hoey Dean of Veterinary Medicine

Dean's Message: One Health

The concept of a holistic approach to medicine and biomedical discovery that encompasses human, animal, and environmental health has been around for a long time. As is often noted, Rudolf Virchow and then William Osler, pioneers of modern medicine, explicitly articulated the concept of a unified approach to medicine, and numerous veterinary epidemiologists such as Calvin Schwabe and James Steele promoted the concept as a key focus of veterinary medicine.

But the concept is far older, spanning the history of biological and medical discovery from Hippocrates through Darwin. From injections of cow pox pustule contents to prevent smallpox, the discovery of similar or identical pathogens in multiple species, and the concept of disease vectors, to the virtually identical

“...every biologist understands the interrelatedness and interdependence – the oneness – of life, a concept captured vividly 45 years ago by the famous and arresting picture taken from space of earth rising.”

approaches to prevention, treatment, and management of disease in pets and people, the unity of medicine is explicit.

Similarly, those of us engaged in biomedical research are acutely aware of the value of studying similar processes in organisms of differing complexity and of the reliance of medical advances on discoveries made in bacteria, yeast, drosophila, zebra fish, and mice, to name a few non-human organisms. And every biologist understands the interrelatedness and interdependence – the oneness – of life, a concept captured vividly 45 years ago by the famous and arresting picture taken from space of earth rising.

What is changing, of course, is not the fundamental oneness of biology, but the increasing tendency of Homo Sapiens to separate human activities and interests from the other creatures around us. Thus animals are commonly perceived as those beings that are not humans (as though humans were not animals), and medicine becomes by assumption human medicine. At risk is the public's appreciation and understanding of the complex and precious non-human elements of our world, including the importance of species diversity, animal/environment interactions, and human/non-human animal co-dependencies.

So what, then, is One Health? Or rather, what are we trying to say when we talk about One Health, and what are we trying to do with the “One Health Initiative?” This effort is a



NASA

Image of the Earth rising over the Moon from Apollo 8

This view of the rising Earth greeted the Apollo 8 astronauts as they came from behind the Moon after the lunar orbit insertion burn. Earth is about five degrees above the horizon in the photo. The unnamed surface features in the foreground are near the eastern limb of the Moon as viewed from Earth. The lunar horizon is approximately 780 kilometers from the spacecraft. Width of the photographed area at the horizon is about 175 kilometers. On the Earth 240,000 miles away, the sunset terminator bisects Africa.

way of reminding all of us of our place within the whole. But more importantly, for veterinarians, it is a way to emphasize the importance of animals and the environment to the human condition; a way to remind the public and policymakers of the importance of these fundamental relationships. In consistent and repeated ways we can emphasize our connection to the whole, the tangible benefits that attend animal/human interactions of all kinds, and the risks of ignoring the health of non-human life. We can remind policymakers that sophisticated treatments of our individual ailments are necessary, but not sufficient, to achieve health, and that medicine is broader than “personalized medicine”—when we lose sight of that, we risk real consequences to the health of our planet.

A sustained and focused effort encapsulated by a single idea can powerfully influence public policy. As veterinarians, we can embrace and advocate a One Health concept in many ways and connect virtually all of what we do to this powerful idea. The College promotes this concept through our educational, clinical, and research programs, but also prioritizes a number of public outreach programs that embody One Health.

For example, this August veterinary students, college faculty, staff, and alumni participated in the Dairy Birthing Center at

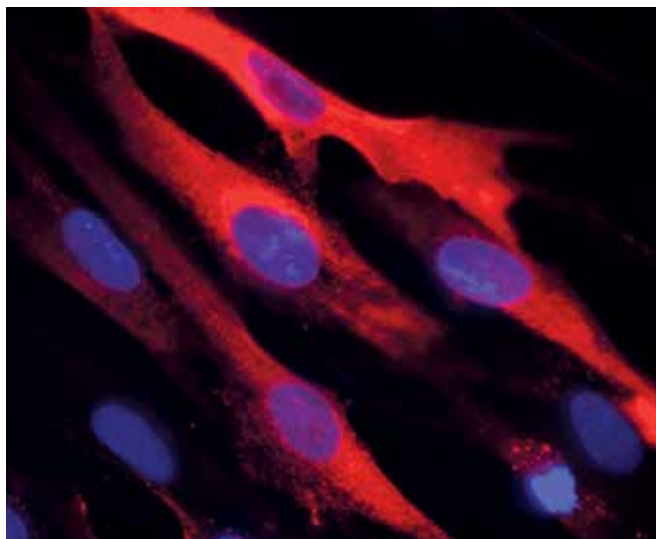
the New York State Fair (vet.cornell.edu/news/nysfair/). In this Center, co-organized by the College, tens of thousands of people witnessed the miracle of birth for the first time. At the Fair they also heard farmers talk about where food comes from, how it is produced, their emotional connection to their animals, and the joy of seeing the cycle of life all around them on the farm.

It is easy for veterinarians to forget how distracted from this life our increasingly urbanized and technologically focused population is and the importance of connecting the public to the simpler facts of life. One Health is an organized effort to emphasize a broader view of health that includes longer term issues such as environmental stewardship, global food security, disease surveillance, the animal-human bond, and our connection to, and dependence on, the life around us.

Cornell’s College of Veterinary Medicine embodies this concept in virtually every one of its programs and we dedicate this issue of *’Scopes* to sharing a few of the programs, projects, and discoveries we contribute to the breadth of One Health.

ONE HEALTH

News Briefs



Study reveals how deadly MERS virus enters human cells

Cornell researchers have uncovered details of how the deadly Middle East respiratory syndrome coronavirus (MERS-CoV) enters host cells, findings that help explain how it can infect many cell types – a hallmark of viral pathogenicity. The results also offer possible new avenues for treatment.

There is currently no cure for MERS, a respiratory illness that can lead to renal failure and kills 35 percent of the people it infects. MERS-CoV may have originated in camels, though bats also carry a form of the virus. Since MERS was first detected in humans in 2012 in Saudi Arabia, more than 830 people have fallen ill worldwide, mostly in the Middle East, Europe and Asia, with a few cases in the United States.

The study, appearing online October 6 in the Proceedings of the National Academy of Sciences, marks the first time researchers have used Cornell's Biological Safety Level 3 facility located in the Animal Health Diagnostics Center. This allowed the study's authors, Dr. Gary Whittaker, professor of virology, and Dr. Jean Millet, a postdoctoral associate in Whittaker's lab, to work safely with the live virus.

The researchers discovered that a common protease enzyme known as furin activates the MERS-CoV to fuse with cell membranes and enter host cells. Drs. Millet and Whittaker suggest that blocking furin at a specific point in the host cell entry process could lead to a treatment by preventing the virus from getting into cells, where it uses the cell's reproduction mechanism to make new viruses.



MIKE OKONIEWSKI

Cornell guides 2014 Dairy Cow Birthing Center at NY State Fair

Cornell veterinary students and veterinarians attended to calving at the NY State Fair's Dairy Cow Birthing Center and explained the birthing process to the public while thousands daily watched live and via a College-hosted 24-7 webcam. This free educational exhibit showcased around three live births daily to share in real-time one of the many miracles of modern animal agriculture, representing a unique opportunity to learn more about dairy farms and the care farmers and veterinarians provide their animals.



Veterinary alum receives national public health award

Lt. Cmdr. Danielle Buttke, DVM '09/PhD '10 received the 2014 James H. Steele Veterinary Public Health Award from the

Centers for Disease Control and Prevention (CDC) in April at the 63rd annual Epidemic Intelligence Service (EIS) Conference.

The award is given to a current or former EIS officer who has made outstanding contributions in the field of veterinary public health. It recognizes Buttke's outstanding contributions in the investigation, control, and prevention of zoonotic diseases and other animal-related human health problems.

"Danielle is one of the brightest students I've met in recent years," said Dr. Alfonso Torres, associate dean for public policy at the College of Veterinary Medicine. "She is a great example of the One Health concept, integrating wildlife, human diseases, animal health, lab research, and fieldwork into her career."



ONE HEALTH

By Michael Carroll

The concept of “One Health” brings together students and professionals from a wide range of scientific

disciplines to benefit the health and well-being of humans, animals, and the environment by focusing on the relationships between these fields. Various symposia at Cornell’s College of Veterinary Medicine foster education and collaboration in One Health.

This year the College hosted the 15th Annual Merial-NIH Veterinary Scholars Symposium. The largest to date, it attracted 620 attendees from ten countries.

“The knowledge of various disease processes continues to grow tremendously,” said Alison Keggan ’17, who attended. “It’s interesting to learn about various pathogens veterinarians work with and the human impact of their spread.”

This year’s speaker sessions focused on sustainability, genetics, cancer, infectious disease, and the impact of veterinary medicine on both humans and animals in these fields. The Merial-NIH Symposium also featured a poster session for students to share their research.

“Not only do I get a deeper understanding of my own work through developing a poster in easily explainable ways, but I also get to look at others’ posters to see what techniques they used and how they can be applied to my own work,” said Valerie Tierney, a veterinary student from University College Dublin.

The College also hosts the Zoonotic Diseases Symposium. Organized by the Veterinary Public Health Association, a student organization within the College of Veterinary Medicine, this year’s fifth annual symposium focused on One Health issues in everyday life. It included talks from veterinarians, physicians, and scientists to provide insight into raw dairy products, organic meats,

backyard poultry, antibiotic resistance, and vector-borne diseases. Dr. Steven Osofsky ’89 gave the annual Poppensiek Lecture: “One World, One Health: From Science to Policy to Action at the Wildlife/Domestic Animal/Human Health & Livelihoods Interface.”

The symposium also emphasized the power of the human-animal bond that can promote people’s wellbeing.

“Our expert speakers represent many different disciplines,” said Kimberly Leidl ’16, who led planning. “Their convergence here to discuss One Health highlights the importance of multidisciplinary approaches to public health issues. We planned the lectures, activities, and round-table discussions to promote awareness of One Health issues in our immediate surroundings and encourage people to approach these issues from a multidisciplinary standpoint.”

In one highlight of the event, Dr. Noha Abou-Madi, a section chief of Zoological Medicine, led a hands-on lab in which attendees could rotate through various stations where they learned helpful tips including how to safely handle backyard pests, care for yards to reduce tick exposure, and protect children from dangerous exposure to animals.

“The science never ends,” said Alyssa Cornelius ’18, an attendee. “There are always new discoveries and advances being made. Participating in symposia keeps us updated on the newest research and methods in veterinary medicine. I learned that there is much to be gained from collaboration between human doctors and veterinarians. The union between their fields offers more benefits than I previously imagined and has opened my mind to the possibilities of multidisciplinary collaborations.”



"I learned that there is much to be gained from collaboration between human doctors and veterinarians. The union between their fields offers more benefits than I previously imagined and has opened my mind to the possibilities of multidisciplinary collaborations." —Alyssa Cornelius '18



PHOTOS BY MICHAEL CARROLL

Highlights from the Fifth Annual Zoonotic Diseases Symposium

Expanding Horizons

builds foundation for a

One Health career

By Carly Hodes





Just as Dr. Steve Osofsky '89 helped shape the vision of the Expanding Horizons program at its inception, the grants he received through it as a Cornell veterinary student helped shape his worldview and career. The ideas for what a summer experiential learning program could entail that he discussed as a student with S. Gordon Campbell, then the associate dean for academic affairs and director of international programs, spawned the Expanding Horizons program, which funds Cornell veterinary students to experience veterinary medicine in developing countries or other places outside the typical practice mold. It has grown over the years to empower hundreds of veterinary students to explore the wider world and the multitude of roles veterinarians can play in improving animal, human, and environmental health.

Pioneering the program, Dr. Osofsky received the first ever Expanding Horizons grant—to assist a researcher running an elephant project in Kenya.

“What turned out to be so valuable that summer of 1986 was what went wrong—not what went right,” he said. “I saw firsthand what happens when an expatriate researcher disregards local knowledge and sensibilities. From a failed research protocol to most of the foreign research team being hospitalized for malaria, that summer was an unforgettable lesson in *what not to do.*” Luckily for Steve, he had taken the proper precautions and did not fall ill, and was able to help his fallen colleagues get to a hospital.

He embarked on a second Expanding Horizons project in the summer of 1987, apprenticing himself to the Florida Panther Project. Working across the Everglades and other parts of Florida, the Florida Game and Freshwater Fish Commission was trying to save the last of Florida’s panthers. The level of respect the team showed for the elusive panthers left a deep impression on him.

“My mentor saw every opportunity to handle a panther as an honor, never forgetting that our patients never visit us by choice.”

“My mentor saw every opportunity to handle a panther as an honor, never forgetting that our patients never visit us by choice,” said Dr. Osofsky. “The highest standards of care and handling

were upheld, despite our often working in the wilderness. The lessons I learned that summer have stayed with me throughout my career.”

In 1988 he earned a third Expanding Horizons fellowship for a zoological experience at a major U.S. zoo, one that ended-up experiencing serious management problems that led staff veterinarians to curtail normal work schedules. Undeterred, Dr. Osofsky turned the problem into an opportunity. The keepers were desperate for assistance, giving Dr. Osofsky the chance to evaluate and draw blood from a baby orangutan, examine a newborn tiger cub, and conduct other hands-on zoological work. Dr. Osofsky is quick to note that “No animals were harmed in the making of that preceptorship!”



As a student, Dr. Osofsky (at right in this 1987 photo) wrote an article for *Natural History* magazine about his preceptorship with the Florida Panther Project.



MIKE KOCK/WCS



MARK ATKINSON/WCS



“In envisioning Expanding Horizons, Dean Campbell wanted to foster students’ internal reflection and self-awareness in the context of being global citizens. He wanted Cornell students to consider the full range of opportunities our training represents, and to understand the importance of using veterinary medicine to really help people, animals and the environment that sustains us all.”

Today, Dr. Osofsky continues to work with the kinds of challenges Expanding Horizons helped prepare him for. As Executive Director of the Wildlife Conservation Society’s (WCS) Wildlife Health & Health Policy program, he oversees all of the WCS Global Conservation Program’s work related to health. He joined WCS in 2002 as its first Senior Policy Advisor for Wildlife Health. Before that, he had served as the World Wildlife Fund’s Director of Field Support for species programs in Asia and Africa,

worked as a zoological veterinarian, and was the first Wildlife Veterinary Officer for the Botswana Department of Wildlife and National Parks. He has also served as an American Association for the Advancement of Science Biodiversity Program Specialist at the U.S. Agency for International Development.

Dr. Osofsky developed the Animal & Human Health for the Environment And Development (*AHEAD*) Program (wcs-ahead.org), one of the foundational components of the WCS ‘One World, One Health’ umbrella initiative, which he helped launch in 2004. He also recently established a new interdisciplinary global program called Health & Ecosystems: Analysis of Linkages (wcs-heal.org).

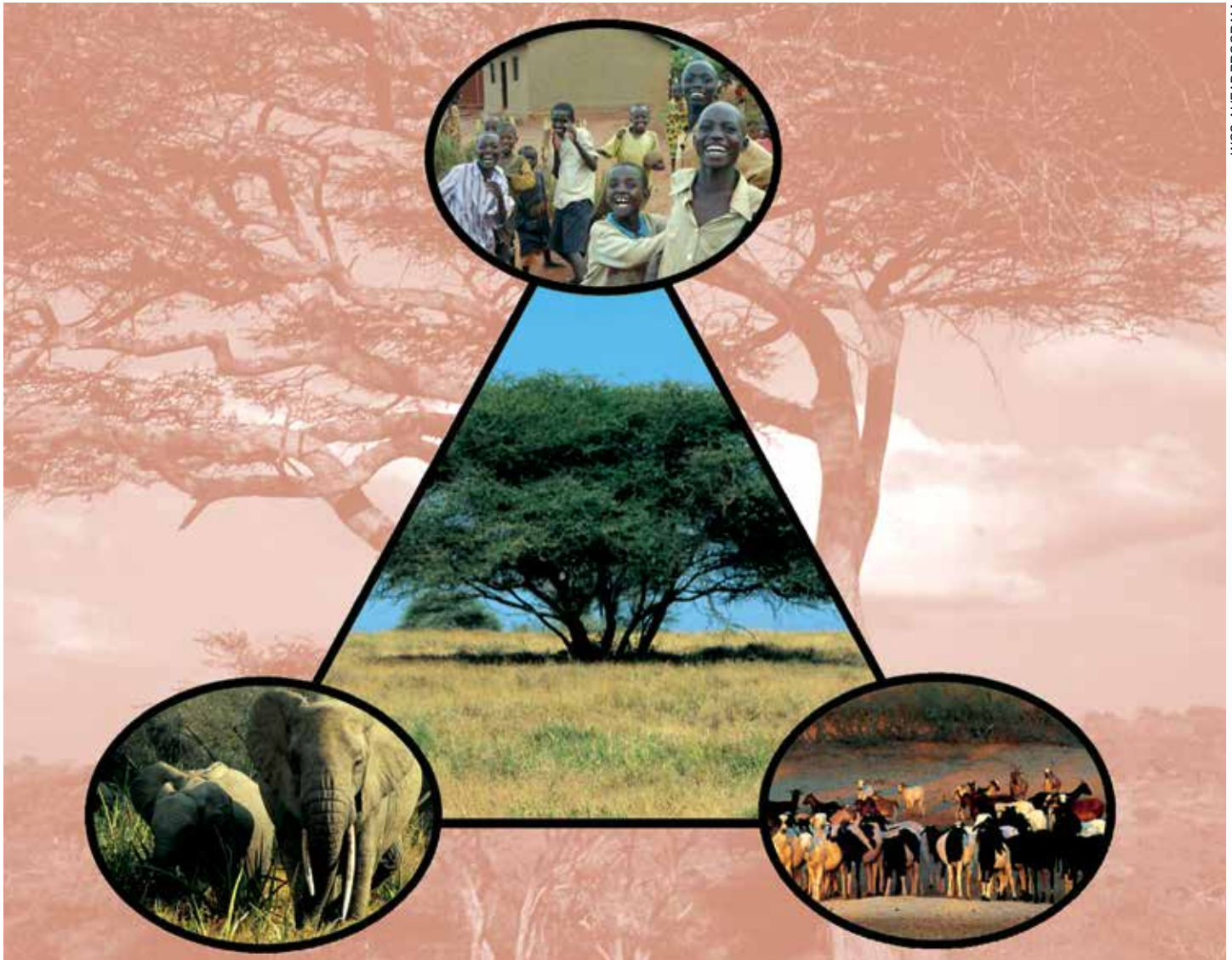
An adjunct assistant professor at the University of Maryland, he regularly counsels veterinary students from around the world, including many Cornell students applying for Expanding Horizons funding, about how to maximize their time in school and design valuable international experiences.

“In envisioning Expanding Horizons, Dean Campbell wanted to foster students’ internal reflection and self-awareness in the

MIKE KOCK/WCS

KAREN HIRSCH, DVM

WCS AHEAD PROGRAM

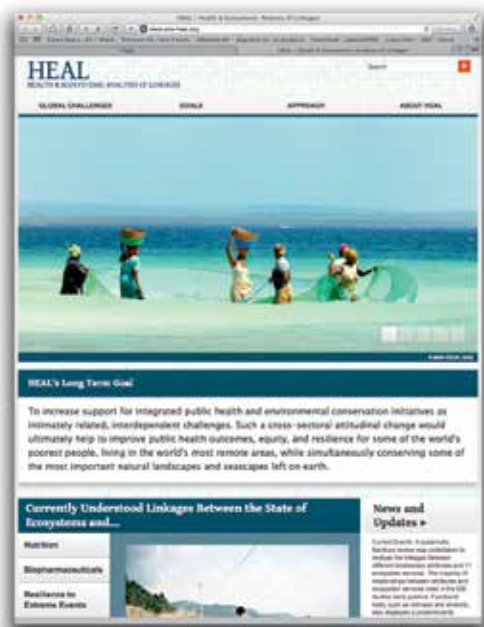


context of being global citizens,” said Dr. Osofsky. “He wanted Cornell students to consider the full range of opportunities our training represents, and to understand the importance of using veterinary medicine to really help people, animals and the environment that sustains us all. I remain forever grateful to Dr. Campbell for his clearly ‘One Health’ vision, although there was no such term at the time.”

STEVE OSOFSKY, DVM



The goal of securing a future for wild nature continues to inspire Dr. Osofsky.



Health & Ecosystems: Analysis of Linkages (wcs-heal.org).

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INFLUENZA FIRST RESPONDERS GRANT FUELS FIGHT AGAINST EVOLVING VIRUS

By Carly Hodes

How does humanity prepare for the next influenza outbreak? As part of a national network of influenza first responders, Cornell continues its part in the pre-emptive planning and research following this rapidly evolving threat, helping understand and head off future epidemics while working toward a universal influenza vaccine.

Fueled by a \$500,000 grant from the NIH Centers of Excellence for Influenza Research and Surveillance (CEIRS) program, Cornell virologist Dr. Gary Whittaker is embarking on the next branch of his work studying emerging influenza strains moving from animals to humans.

“Because influenza evolves so quickly we need research teams ready to act as first responders,” said Whittaker. “The traditional grant based system is not appropriate in this scenario. When a new virus arrives, there is no time to write grants. The Centers of Excellence model lets us continuously monitor and strategize against influenza’s progression. We can now study these viruses as soon as they emerge, generating and distributing a complete virus genome sequence to labs around the world in a matter of days.”

Whittaker’s work began in 2007 when the NIH’s CEIRS program created a network of research and surveillance labs for both human and avian influenza. One of these, University of Rochester, focuses on human immunology and vaccine trials. Seeking Cornell’s advanced facilities and expertise crucial to developing new vaccines, they began collaborating with Whittaker’s lab, which studies how viruses activate and turn deadly. For example, when examining what activated H1N1, which caused the 2009 human influenza outbreak, Whittaker found mutations that made it more pathogenic than sister strains.

He continues to seek such mutations as influenza evolves.

“Right now, several types of avian influenza circulating in Asia, including H7N9 and H9N2, pose a much more serious threat than H1N1 ever did,” said Whittaker. “These are different from anything we’ve seen before. Human immune systems aren’t recognizing them at all. There are no vaccines existing or in the pipeline. Mortality rates are very high in a number of current strains, and there’s a chance they could be even more pathogenic. A completely new virus in humans, subtype H10, killed someone for the first time ever in February. Subtype H7N9 has infected hundreds, killing many. We’re trying to figure out why.”

Influenza subtypes are named after two of influenza’s eight genes—H and N, the ones that code for proteins on the surface

We can now study these viruses as soon as they emerge, generating and distributing a complete virus genome sequence to labs around the world in a matter of days.”

of virus particles. Sixteen of the 18 influenza subtypes in nature infect wild birds. So far only three have caused serious problems in humans and another three typically cause disease in poultry. Thus wild animals host a reservoir of viruses waiting to infect humans. It’s hard to predict which type will cause the next problem.

“It comes down to whether a virus can pick up the right mutations to propagate in humans,” said Whittaker. “Once it’s able to transmit, it can go global fast. Right now we’re seeing internal genes in type H7N9 corresponding to the highly infectious subtypes H9N2. The latter are sharing an unusually

“It comes down to whether a virus can pick up the right mutations to propagate in humans, once it’s able to transmit, it can go global fast.”

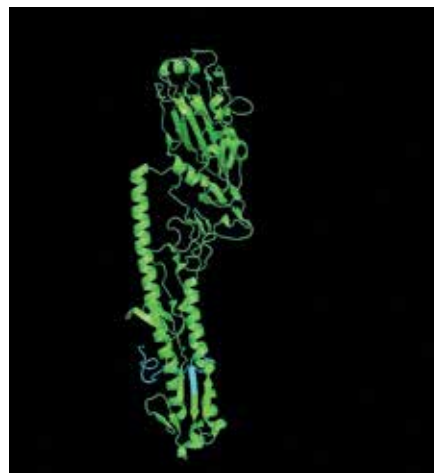


pathogenic genetic platform with other subtypes. We’re hoping to find what that platform is and develop vaccines against it to head off the growing threat that one of these causes a worldwide pandemic.”

Whittaker is studying how various influenza subtypes become pathogenic, seeking virus proteins to target with vaccines. Working in air-locked biosecurity level 3 facilities at Cornell’s Animal Health Diagnostic Center, Whittaker and his colleagues don disposable suits and powered respirators to study H7N9. The lab also studies several other viruses with marked changes in their cleavage sites – the on switch that turns virus particles from passive to infectious.

“Our ultimate goal is to develop an influenza panacea—a vaccine or therapeutic to respond to any influenza strain that emerges,” said Whittaker. “Currently we’re developing and testing therapeutics, and working with University of Rochester’s human medicine experts and a Cornell bioengineering lab that has new vaccine platforms that can generate immunity across subtypes.”

“Our ultimate goal is to develop an influenza panacea—a vaccine or therapeutic to respond to any influenza strain that emerges. . .”



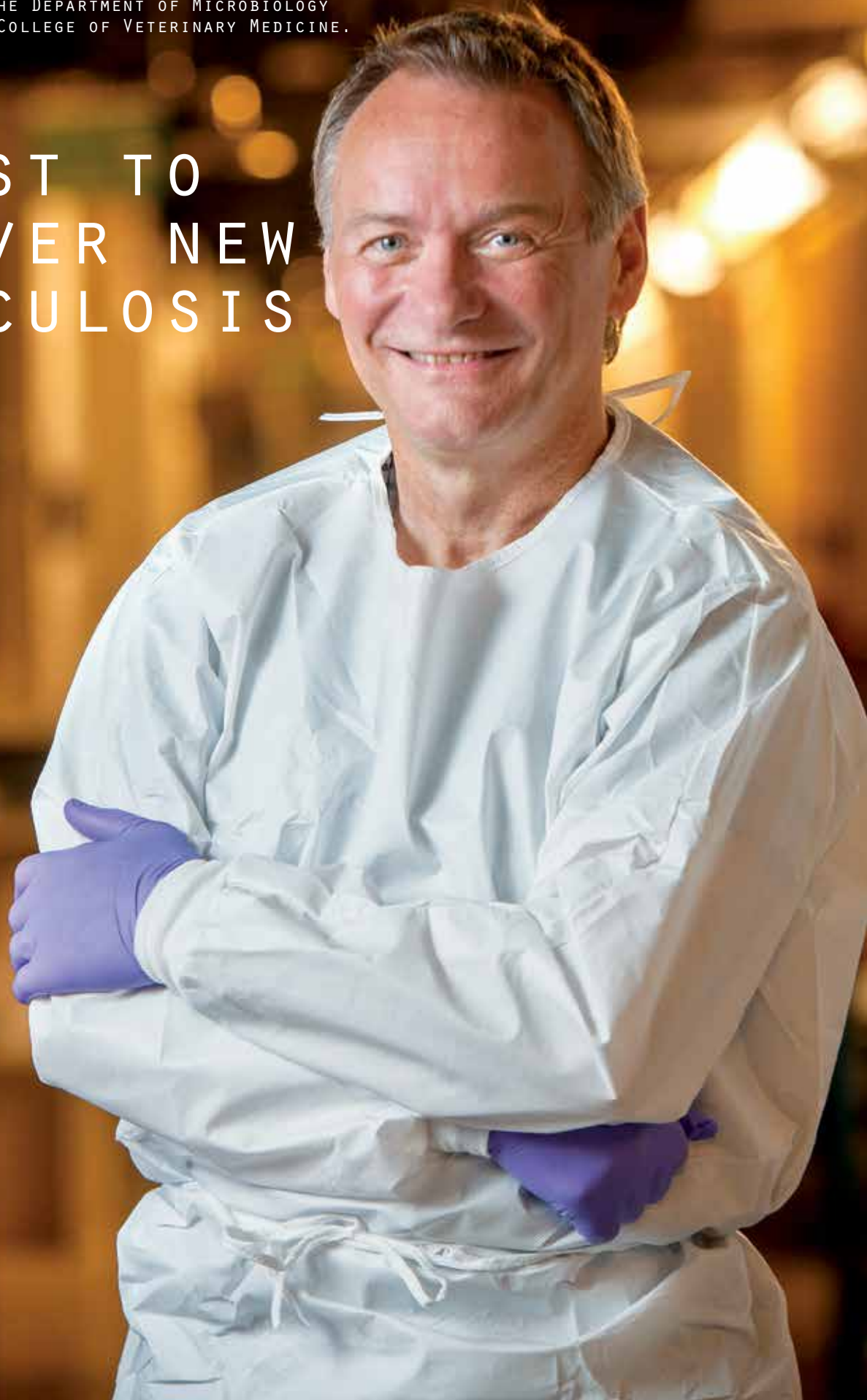
PROVIDED

Three dimensional model of influenza hemagglutinin (HA). The fusion peptide and protease activation site are shown in blue

DR. DAVID RUSSELL, THE WILLIAM KAPLAN PROFESSOR OF INFECTION BIOLOGY IN THE DEPARTMENT OF MICROBIOLOGY AND IMMUNOLOGY AT THE COLLEGE OF VETERINARY MEDICINE.

A QUEST TO DISCOVER NEW TUBERCULOSIS DRUGS

By Carly Hodes



With a \$1.5 million grant from the Bill & Melinda Gates Foundation, Cornell faculty have embarked on a quest to discover new drugs to combat tuberculosis (TB), the leading cause of death from bacterial infection.

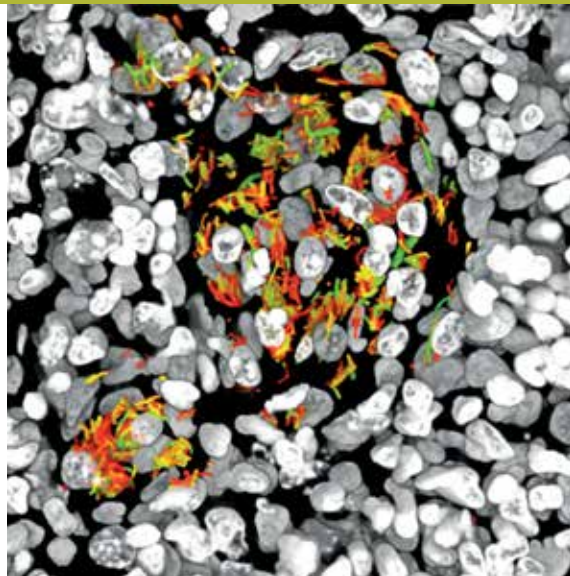
Because TB is an orphan disease—chiefly afflicting people in developing countries and offering poor profit prospects to most drug developers—this project is one of few to offer hope against an epidemic that grows more untreatable by the day.

In June, Cornell faculty launched a search for chemical compounds that could be developed into new TB drugs. They are screening a library of nearly 1 million physical chemicals collected by the California Institute for Biomedical Research (Calibr), a nonprofit organization established to accelerate translation of basic biomedical research into medicines.

“As drug discovery and development is an extremely costly process, nontraditional routes involving academic and biotech partnerships such as our Cornell/Calibr cooperative provide an effective alternative approach to drug discovery,” said TB expert Dr. David Russell, the William Kaplan Professor of Infection Biology in the Department of Microbiology and Immunology at Cornell’s College of Veterinary Medicine.

Applying its extensive experience screening for potential drug compounds, Dr. Russell’s lab is conducting two biological screens. In the first, they will seek to identify compounds effective in attacking *Mycobacterium tuberculosis* (Mtb) – the bacterium causing TB – within the environment of its host cell, white blood cells called macrophages.

“The traditional method of drug discovery involves creating mutant bacteria to find which gene products they need most for survival in a rich broth medium, then testing compounds to attack those targets using purified recombinant proteins,” said



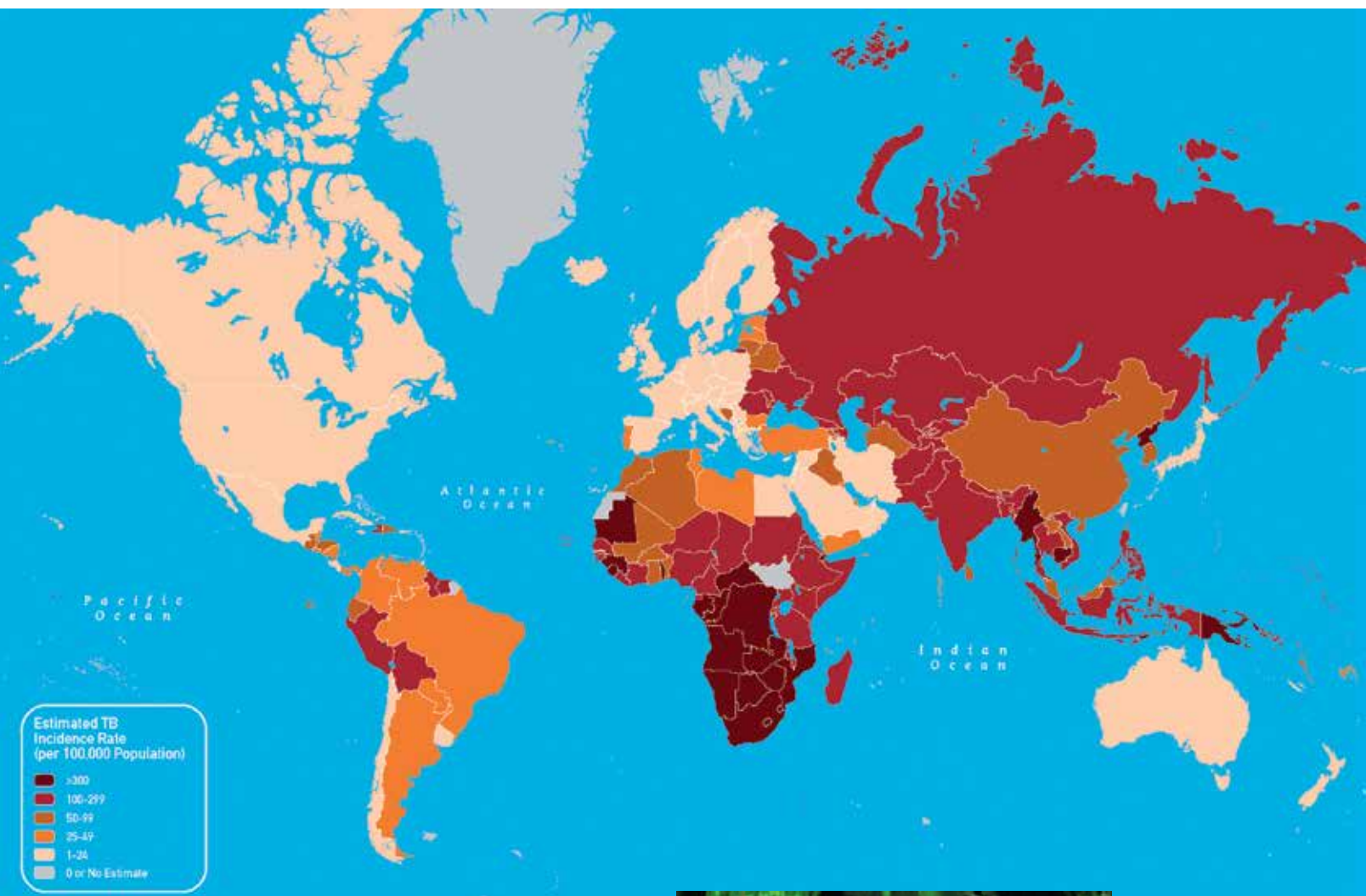
SHUMIN TAN

An image taken by confocal microscope showing *Mycobacterium tuberculosis* bacilli in the lung tissue from a mouse. The host cell nuclei are colored grey and the bacteria are showing red and green fluorescence. All the bacteria are red, but the amount of green fluorescent signal corresponds to the degree of host stress that the bacteria are experiencing.

Dr. Russell. “But this isn’t working for drugs that work after a person has been infected. If you’re infected with TB, the majority of bacteria will live inside your macrophages. ... We are screening for compounds that will kill Mtb inside its host cell.”

In a second approach, Dr. Russell’s lab will seek synergizing compounds that work together with existing frontline drugs by enhancing the drugs’ power to fight Mtb living inside host cells. When multiple compounds work together in synergy, the concentrations of each compound can be lessened to achieve the same effect or better.





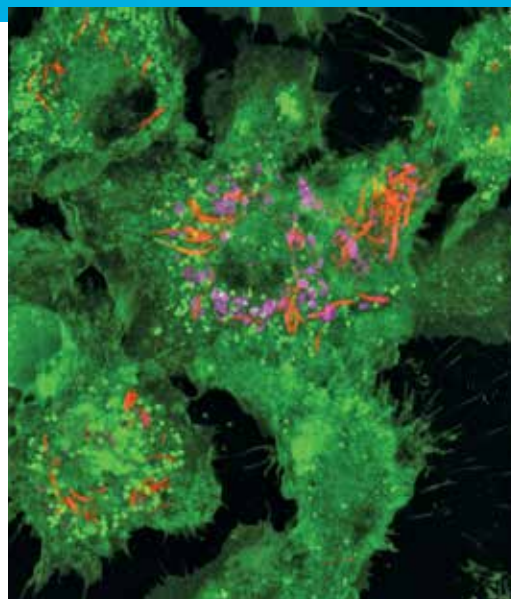
Estimated tuberculosis incidence rates, 2010, Centers for Disease Control

“Compounds we find this way could reduce the likelihood of drug resistance,” said Dr. Russell. “With lower concentrations and increased potency, the length of TB treatment could be shortened from its typical nine months to as little as two months. That could have a huge impact on people’s ability to finish their treatment.”

In a previous screen the lab performed on a library of 340,000 compounds provided by Vertex Pharmaceuticals, they were able to screen 30,000 compounds per week. For each hit that proves promising, the scientists will conduct chemical modeling to improve the compound’s bioavailability and potency, synthesizing similar compounds around the initial compound’s basic structure to see which variants improve efficacy.

In parallel, Dr. Russell’s lab is looking at how hit compounds work, seeking to identify drug targets and modes of action as well as what bacteria do to try to overcome the drugs and how readily they generate mutants to develop resistance.

“The more you know about the biology of the interaction between the compounds and the bacteria the better,” said Dr. Russell. “There is a lot of untapped potential for finding new ways to fight the major global health problem that TB presents.”



MARIA PODINOVSKAIA

Another confocal microscopy image showing macrophages in culture infected with *Mycobacterium tuberculosis*. The bacteria are expressing red fluorescent protein. The macrophages are labeled with green fluorescent cholesterol, and their lysosomes are labeled with a purple fluorescent tracer.

ANIMAL JOINT SURGERIES MAY LEAD TO HUMAN REPAIRS

By Krishna Ramanujan

A pair of unique surgical procedures performed on animals promises to revolutionize the ways surgeons repair cartilage and meniscus tears in human knees and other joints.

In the first set of procedures, a cross-institutional, interdisciplinary team of surgeons and researchers tried a new method for cartilage repair on horses at the Cornell University Hospital for Animals on August 21.

Another team tried a meniscus repair procedure on sheep September 3 and 4. The meniscus repair involved custom-designed and individualized replacement parts. With information from an MRI scan of the patient's joint, the researchers used a 3-D printer to assemble an artificial meniscus fitted to the patient's body.

The surgeons and researchers who took part in these groundbreaking preclinical trials include medical staff from Cornell's College of Veterinary Medicine, the Hospital for Special Surgery (HSS)—a section of the New York-Presbyterian Healthcare System and an affiliate of Weill Cornell Medical College in New York City—and the New York Giants football team.

"The goal is to make these technologies available for people," said Dr. Lisa Fortier, professor of large animal surgery at Cornell's College of Veterinary Medicine. "If they do well in these animals, then the FDA [Food and Drug Administration] can approve it for use in humans," a process that can take months or years, Fortier said.

The August 21 procedures involved one-hour surgeries on five horses to practice a new procedure and use a cartilage repair device developed by Suzanne Maher, a biomechanical engineer at HSS and a member of the research team. She designed an off-the-shelf biocompatible scaffolding that can be surgically inserted into damaged cartilage for repair and to prevent the onset of arthritis.

Cartilage defects occur due to overuse or from such traumatic episodes as a crucial ligament tear or rupture, for example.

"We know that any of those types of cartilage defects can lead to arthritis," which the procedure aims to prevent, Dr. Fortier said. Once cartilage is torn, there is currently no viable repair nor does it heal on its own, she added.

Team members included Dr. Fortier, a horse surgeon, and Dr. Russ Warren, former surgeon-in-chief at HSS and a specialist for the New York Giants football team.

The second procedure involved a preclinical meniscal transplant on sheep, which is part of a multiyear National Institutes of Health grant. When torn or deteriorated, the meniscus does not heal on its own. So far, the "gold standard" for replacement comes from cadavers, tissue that is hard to match and obtain and may transmit diseases, Fortier said. Artificial scaffolds have also been ineffective.

Dr. Jeremy Mao, professor of dental medicine at Columbia University, developed a meniscal transplant made from biodegradable polyester and that includes growth hormones. Using an MRI scan and a 3-D printer, the researchers can build an individualized meniscus using the polyester. Once transplanted, the new meniscus is designed to recruit the body's own stem cells for healing.

Over the two days of meniscus surgeries, the team—including Fortier and surgeon Dr. Scott Rodeo, a specialist with HSS—will operate on eight sheep, though the entire project will entail 60 such surgeries for controls and to test levels of growth factor hormones.

"My goal is to be able to use these procedures in my own [animal] patients," added Dr. Fortier.



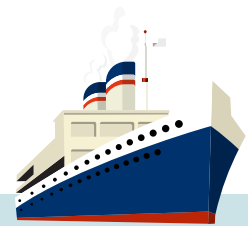
A horse undergoes knee surgery under the supervision of Dr. Lisa Fortier, professor of clinical sciences at the College of Veterinary Medicine, and a cross-institutional interdisciplinary team of animal and human surgeons.



Cat flu and the cruise ship blues:

Lessons from feline virus can help teach us about a common human illness

By Merry Buckley



Dr. John Parker, a virologist at the Baker Institute for Animal Health, is working on a puzzle.

Feline calicivirus has a range of different effects in cats: temporary and mild flu-like symptoms in most, more chronic mouth and throat symptoms in others, and, in rare cases, severe life-threatening disease throughout the body.

Dr. Parker is trying to determine why the virus has such variable effects, work that promises not only to help cats but might also eventually lead to treatments or vaccines for a familiar human disease: stomach flu.

As part of a large family of viruses called *Caliciviridae*, feline calicivirus is related to human norovirus, a pathogen perhaps best known for causing well-publicized outbreaks of gastroenteritis on cruise ships. Dr. Parker says that studies of the feline virus can inform studies of norovirus, a notoriously difficult pathogen to study in the lab.

Their common features highlight the importance of One Health in managing diseases: what scientists learn about animal diseases can impact knowledge of human diseases. Developing effective treatments for one disease can build the foundation for treatments for others.

The idea of One Health would not be difficult to explain to viruses, which often exploit the connections between human health, animal health, and the environment to meet new hosts. Feline calicivirus and norovirus may have different hosts and cause different diseases, but they share a great deal in common at the molecular level. “The structures of the two viruses are very similar,” said Dr. Parker, “so the process of infection should be similar.”

SOLVING THE PUZZLE

Dr. Parker is searching for possible explanations for why some cats with feline calicivirus experience short-term flu-like symptoms while others develop a chronic mouth condition in which their gums grow thick and inflamed, making it painful to eat. He is focusing on how the virus first binds to cells and gets inside. He and his postdoctoral researcher, Dr. Zhengchun Lu, have sequenced the genomes of 25 cats. They are examining genes responsible for creating receptor proteins on the outsides of cells to see if differences in these receptors might play a role in how the virus attaches and infects different cats.

In another project, Dr. Parker is detailing how the shape of the virus changes when attaching to receptors during infection. By defining these shapes, it may be possible to design a vaccine to target the virus during this vulnerable moment, preventing infection before it starts.

“By understanding those steps you can identify places in the process where you can block it,” said Dr. Parker.

This kind of basic science lays the foundation for One Health work, establishing facts about viruses and diseases and outlining connections between different species so that efforts to curb disease and improve animal and human health can be more effective. Parker’s work to define how calicivirus binds to cells may lead to drugs and vaccines for feline calicivirus, and those strategies could eventually be carried over to treat and prevent infection with norovirus or other pathogens.

“Discovery is never planned,” said Dr. Parker. “I try and make sure our lab has the freedom to pursue intellectual curiosity.”

Sports medicine and rehabilitation service gets
pets back in the game

By Carly Hodes



Judy Keil and her 14-year-old companion, Tella, at the Sports Medicine and Rehabilitation program. Tella receives physical therapy from Dr. Christopher Frye '11 in the College's underwater treadmill.





Jeffrey Smith and Wilson, a five-year-old Brittany

From elite champions of the sporting circuits to old dogs who enjoy casual walks, most active animals suffer setbacks at some point. Cornell University Hospital for Animals has initiated a new Sports and Rehabilitation Medicine service to help them return to their feet and get back in the game.

Dr. Joseph Wakshlag, a member of the American College of Veterinary Sports Medicine and Rehabilitation, directs the program. Specializing in rehabilitation, the service treats companion animals recovering from injuries or experiencing orthopedic or neurologic problems. Since launching this spring, the program has helped five to 10 patients per week recover performance abilities and stay active.

One patient, Wilson, a five-year-old Brittany, has returned to romping through the woods after a life-threatening ordeal. One day he had awoken unable to stand and refusing to eat. His owner Jeffrey Smith took him to Cornell for critical care, where they found he had a temperature of 106, a cervical disc tear with resulting neurological disease, and severely swollen joints due to septic infection from a rotting tooth.

When Wilson stabilized, Dr. Christopher Frye '11, the first dual resident in Cornell's new residency combining Clinical Nutrition and Sports Medicine and Rehabilitation, oversaw his rehabilitation sessions and taught the Smiths home exercises to help Wilson recover.

"When he returned home he couldn't walk, but Wilson has made remarkable progress," said Smith. "He can now walk several miles and trot at a good pace. Recently he returned to running in the field and enjoyed plowing through the brush! Wilson and our family wouldn't have made it through this ordeal without Cornell's professionalism, compassion, and expertise."

Another patient, Tella, has battled worsening arthritis from a young age. Her owner, Judy Keil, likes to let her dogs out of the car at the start of her long driveway to run up to their house. But over the last few years Tella became unable to participate.

Keil took her now 14-year-old companion to the Sports Medicine and Rehabilitation program, where she received platelet-rich plasma regenerative therapy to rejuvenate her joints, a technique adapted from human and equine medicine. She began a weekly regime of acupuncture and physical therapy including gentle exercise in the College's underwater treadmill.

"She's doing things now she hasn't done in years," said Keil. "Her legs are stronger and she has more endurance, going in the treadmill for a full 30 minutes. Now when I get to my driveway



“He can now walk several miles and trot at a good pace. Recently he returned to running in the field and enjoyed plowing through the brush! Wilson and our family wouldn’t have made it through this ordeal without Cornell’s professionalism, compassion, and expertise.”
—Jeffrey Smith

For a quick peek at the service in action, visit: bit.ly/CornellSportsMed



Dr. Christopher Frye '11, the first dual resident in Cornell's new residency combining Clinical Nutrition and Sports Medicine and Rehabilitation, with Jeffrey Smith and Wilson.



Tella walking the walk.

she crawls over me eagerly to be let out, and gallops up to the house. She’s brave and has made extraordinary progress.”

The program offers many modalities, including shockwave and therapeutic ultrasound, transcutaneous electrical nerve stimulation, low-level light laser therapy for wound healing and chronic pain, and electro-acupuncture. A force plate, which measures how well an animal uses a limb, can validate whether and to what extent a treatment works.

Wakshlag is involved in studies to determine whether and how supplements enhance performance and how diet can influence recovery. The program is also conducting new research into regenerative medicine techniques such as platelet rich plasma therapy to help heal chronic joint disease. He will introduce basic rehabilitation lectures into the veterinary curricula, and students serving in the orthopedics and neurology rotations may spend time with the new program’s patients.



MONITORING MULTI-DRUG resistant *Salmonella*

An evolving threat to livestock,
people, and pets

By Carly Hodes

Salmonella can cause serious disease on cattle farms, killing calves, causing cows to abort, contaminating raw milk, and harming humans along the way.

As the cattle-adapted strain *Salmonella* Dublin creeps into the northeastern United States, veterinarians and farmers struggle to catch the bacteria in time to protect livestock and stymie the growing public health risk.

Meanwhile the Animal Health Diagnostic Center (AHDC) at Cornell's College of Veterinary Medicine has uncovered a troublesome turn: it has increasingly been isolating multi-drug resistant *Salmonella* Dublin from samples submitted from cattle premises in the Northeast.

"All the samples we've seen in recent years have shown resistance to a wide range of antibiotics," said Dr. Belinda Thompson, senior extension associate at the AHDC. "We don't know how and when multi-drug resistant strains emerged in the northeastern bovine industry, or how widespread they are, but we follow up on every case to help contain outbreaks."

The AHDC monitors and combats this and other diseases through diagnostics, consultations with veterinarians, and outreach programs. Its veterinarians cooperate with New York State to provide educational materials about the control of *Salmonella* Dublin in herds and conduct outreach education programs across the Northeast to help veterinarians understand and control the disease. They also participate in research projects to gauge the effect of recommended control measures in modern dairies and research the disease's prevalence in collaboration with the USDA.

A one-of-a-kind test the AHDC is using to identify *Salmonella* Dublin infections has offered farmers a new tool to keep the disease at bay. The test detects antibodies, making it cheaper, quicker, safer, and more sensitive than prior methods relying on culturing bacteria. It also reveals dormant infections in carrier animals, helping farmers and veterinarians monitor infection spread over time and track the impact of control measures.



Rachel Peck, Animal Tech: Replacements/Herd Health, and Dr. Belinda Thompson lead five-day-old calf, Cookies and Cream, back to the barn.

"This disease needs to be controlled with management practices on the farm. Recent introduction of *Salmonella* Dublin into a population with no prior exposure might, under the right conditions, result in an explosive outbreak."

"This disease needs to be controlled with management practices on the farm," said Dr. Thompson. "Recent introduction of *Salmonella* Dublin into a population with no prior exposure might, under the right conditions, result in an explosive outbreak. Outbreaks of clinical illness in calves, in herds where the infection is apparently endemic, are reported to occur when there are breakdowns in management."

To reduce the risk of infection, the AHDC recommends maintaining clean maternity pens, prompt removal of calves from dams, fastidious colostrum management, milk and feed utensil sanitation, pasteurization of raw milk fed to calves, promotion of good air quality, and reduction of stress by providing clean, comfortable housing and proper nutrition. Warning signs including fever, abortions, and respiratory signs (especially in calves) including coughing and labored breathing can clue cattle caretakers in to possible infections. Unlike in other strains of *Salmonella*, diarrhea is not a consistent

sign of illness associated with *Salmonella* Dublin

People, other livestock, and companion animals are also susceptible. Individuals with weakened or suppressed immune systems, pregnant women, raw milk consumers, and the very young and very old are most at risk. *Salmonella* Dublin infections are reported in apparently healthy individuals who do not fall in these higher risk groups, however.

"Beyond cattle, we're very concerned with the public health implications of *Salmonella* Dublin on dairy farms," said Dr. Thompson. "People can get very sick from this disease. Animal caretakers in contact with *Salmonella* Dublin-infected animals are exposed to infectious bodily excretions. It can also threaten companion animals—we recently had a case of a dog infected after chewing on raw meat bones. Just as drinking raw milk puts people at risk, raw meat diets put pets at risk. Avoiding these practices can help prevent infection."

The AHDC accepts samples from sick and apparently healthy animals to be tested for *Salmonella* Dublin and other infectious diseases. Veterinarians can consult with microbiology and extension staff for diagnostic and surveillance advice.

<https://ahdc.vet.cornell.edu/>

For more information regarding salmonellosis and best management practices, review the *Salmonella* module found at: <http://nyschp.vet.cornell.edu/>

Advice from Cornell alumnus helps establish new scholarship

By Michael Carroll

Ruth Mort was a savvy businesswoman and a partner in a successful design business. She had a sense of adventure, earning a private pilot's license. But what really defined her was her lifelong love of animals. As a young girl she could always be found at the stable at the end of the road she lived on, caring for and riding the horses housed there.



Over the course of her life, she owned many cats and dogs, including those unwanted and discarded by others. She also felt protective of the wild animals in her backyard. Whether it was Petey Possum, Ralph the raccoon, or the wild turkeys and deer that frequented her yard, she cared for them all.

Ruth's niece Beverly Cronkite was close to her. Beverly and her husband helped Ruth, especially in her later years. When she became unable to care for herself and her animals they made arrangements so she could continue to live in her home and enjoy her animal friends.

Ruth entrusted her estate to her niece and mentioned that she would like her money to go to a worthy cause on behalf of animals. Beverly had heard stories of her aunt taking her pets to Cornell alumnus Dr. John (Jack) Dwyer '66, and she found his contact information in her belongings.



"She was good-hearted, compassionate, and loved her animals," said Dr. Dwyer. "Beverly called and asked, 'Can you suggest a place that you think she would want that money used?' I thought I'd send it where it would do the most good, and of course I thought about my alma mater."

"I feel Cornell has a good program," said Beverly, who made arrangements for the scholarship in Ruth's name. "I hope someone who really deserves it will be able to benefit from this scholarship and help animals."

With a \$500,000 endowment, Beverly established the Ruth Mort Scholarship for veterinary students. As part of the veterinary curriculum, these students learn surgical skills by spaying and neutering feral cats, and since Ruth was a lifelong proponent of spay/neuter programs to reduce unwanted cats, this made it an especially good fit.

"Ruth had a lot of confidence in Cornell graduates and respected the education they receive, so I think this scholarship is something she would look on favorably," said Dr. Dwyer.

Dr. Dwyer knew Ruth for forty-five years and always admired the way she treated others. Ruth saved a positive newspaper article about Dr. Dwyer for a number of years and mailed it to him during a difficult point in his life—a simple gesture that summed up the way she lived.

"When I think of Ruth Mort, the word that comes to mind is 'class,'" said Dr. Dwyer. "She was very dignified, compassionate, intelligent, and generous. That to me is what a classy person is about."

Today her generosity and love for animals live on thanks to the help of her niece and her long-time friend and Cornell alumnus.

DR. JOSEPH KINNARNEY CHOSEN AS AVMA PRESIDENT-ELECT

By Carly Hodes

Dr. Joseph Kinnarney '80 has been chosen as the new president-elect of the American Veterinary Medical Association (AVMA).

He was elected by the AVMA House of Delegates during their meeting at the 2014 AVMA Convention in Denver July 25 and will assume the association presidency in July 2015.

Dr. Kinnarney is a companion animal practitioner and president and chief executive officer of Reidsville Veterinary Hospital in Reidsville, N.C. He has been an active participant in organized veterinary medicine since serving as president of the student chapter of the AVMA at Cornell. His service to his alma mater continued after graduation; he has served three terms on the College Advisory Council and currently serves on the Baker Institute Advisory Council.

The AVMA, founded in 1863, is one of the oldest and largest veterinary medical organizations in the world, with more than 85,000 member veterinarians worldwide engaged in a wide variety of professional activities and dedicated to the art and science of veterinary medicine. Dr. Kinnarney served on the AVMA House of Delegates for 17 years, spent



Dr. Joseph Kinnarney

two years as AVMA vice president and was a member of the AVMA Executive Board for six years.

During his term as AVMA president, Dr. Kinnarney anticipates focusing on economic issues facing the veterinary profession and communicating with the public about the important roles veterinarians play in society.

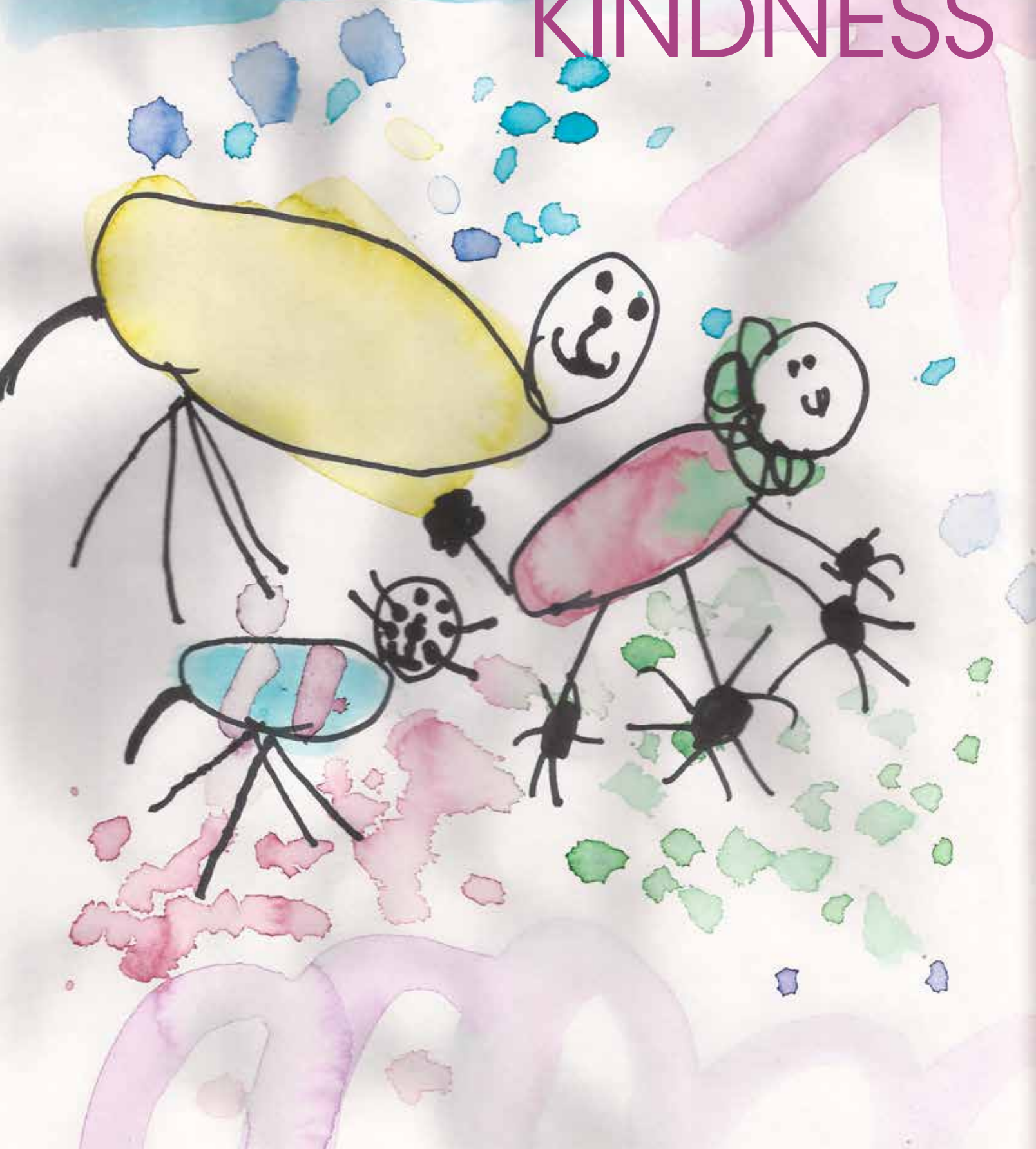
“Veterinarians from all walks of professional life, whether they work in companion animal medicine, food animal medicine, public health, food safety, biosecurity or research, bring much value to the American public,” said Dr. Kinnarney. “There has never been a time in the history of the world that we have had so much knowledge and skill. We must use this knowledge and skill to grow all services of veterinary medicine to ensure both animal and human health.”



“Veterinarians from all walks of professional life, whether they work in companion animal medicine, food animal medicine, public health, food safety, biosecurity or research, bring much value to the American public.” — Dr. Joseph Kinnarney '80

Catherine

A GIFT OF KINDNESS



Scholarship honors child's love for animals big and small

By Michael Carroll

Catherine Hubbard developed a love for animals at an early age. When her parents bought dolls for her, she was more interested in the dogs that came with the dolls. Catherine's mother, Jenny Hubbard, fondly recalls watching her young daughter interact with animals.

"She wanted to be close to animals and would do whatever she could to be a part of them," said Hubbard. "She'd go out each day and she would get an animal and keep it for the day. Then she would send it home saying 'you have to tell your friends I'm kind and you have to come back'. We weren't surprised she would catch a butterfly the next day because they would come back to her. She just had an essence of kindness and peace about her that animals would be drawn to."

Catherine's life was tragically cut short on December 12, 2012 when she was one of 20 children and six adults killed at Sandy Hook Elementary School. However, her love for animals and spirit of kindness live on in a new scholarship made possible through a private corporate donation. The award established in her honor is to be awarded annually to four students interested in a future in shelter medicine.

"She was very accepting, caring, and gentle with animals," said Hubbard. "She would put their welfare first. She always had a sense that she would need to do what was best for them."

Whether it was leaving scraps of food for feral cats in the neighborhood, or making her family stop on a road trip to pick



up a stray dog, Catherine had a natural gift to put the needs of animals first. That is why it seemed fitting to develop a scholarship focusing on shelter medicine at Cornell.

"There's a huge need to help people build skills and care for animals that need that type of support," said Hubbard. "Our focus has been on honoring her in the way that she would want, so why wouldn't we honor Catherine with the best school in the country?"

Hubbard's hope is that this scholarship will help to lift financial burdens off the recipients so they can focus on improving the lives of the animals her daughter loved.

Catherine's spirit of kindness toward animals will also live on through the Catherine Violet Hubbard Animal Sanctuary, which will provide adoptive programs, a farm sanctuary, and native wildlife rescue and release along with programs to promote kindness and compassion toward animals and the environment. To learn more about the CVH Animal Sanctuary visit cvhfoundation.org.

"The Sanctuary is almost a real time kindness in action, and the scholarship is helping the people that help the animals that Catherine loved," said Hubbard. "Catherine would want people to know that she was kind. At the end of the day if we're kind to

each other and kind to the animals that live among us we'll be much better off."

"She was very accepting, caring, and gentle with animals, she would put their welfare first. She always had a sense that she would need to do what was best for them."



Catherine
Violet
Hubbard
ANIMAL SANCTUARY

Creative ways to give

Each year our veterinarians treat tens of thousands of animals—pets, farm animals, wildlife, zoo animals and exotic species. To ensure the best health care for all of our patients and to teach using the latest technology, the medical staff must have access to equipment that inspires innovation. Our work depends in large part on private donations to purchase equipment, such as the items below. To contribute or for more information on giving opportunities, contact Amy Robinson at amy.robinson@cornell.edu or 607.253.3742.

I CAN SEE CLEARLY NOW

A head-mounted camera with recording capabilities allows a view of large animal surgeries that otherwise would be very difficult to watch up close, providing an important educational resource for students and clinicians. **\$8,500**

THE EYES HAVE IT

Improve our ability to observe ocular conditions in large animals with a pan-optic instrument that can be tethered to an iPhone to take picture for use in educational lectures. **\$1,500**

NEW NEBULIZERS NEEDED

Nebulizing large animal patients – a required part of clinical training at Cornell – can improve the chances of recovery. Additional nebulizers are needed in case there are more than two large animal patients needing this therapy. **\$3,000 each**

COMFORTABLE CRATES FOR CATS AND CANINES

Holding crates for patients visiting our Community Practice Service keep them comfortable and safe during their visit to the Hospital. **\$185 each**

HEALING HEAT

Keep an animal warm during their time in our Community Practice Service, where they are likely to be undergoing a simple surgery. **\$600**

SMILE FOR THE CAMERA

A dental operating microscope will allow the Dentistry and Oral Surgery Service to perform intricate surgical operative and restorative procedures on dogs and cats, including root canal, cleft palate repair, and treatment of cavities. The microscope will also serve as a high-tech educational and research resource. **\$26,000**

SAVE A SPECIES

Sponsor a round of in vitro fertilization studies of assisted reproduction techniques using dogs as models for endangered wild dogs and wolves. **\$5,000**



MICHAEL CARROLL

Children at the Greater Ithaca Activities Center learn about shelter medicine and meet Jack, who found his forever home through Maddie's® Shelter Medicine Program at Cornell.

2014

dean's college report

I am pleased to share highlights from the progress made on our Strategic Plan by the College of Veterinary Medicine over the past fiscal year. That plan, developed in 2008 with input and guidance from representatives of the College's stakeholders, continues to inform our programmatic efforts to:

1. Strengthen our premier DVM and postgraduate teaching programs through innovative and collaborative initiatives that best prepare our students to meet the challenges of the 21st century
2. Transition Cornell from a national to a global leader in animal health
3. Enhance Cornell's position as the top-ranked veterinary college in biomedical discovery and build on existing and emerging strengths to foster the understanding and treatment of disease

PRE-CLINICAL CLASS EXPANSION

Cornell has the smallest class size in the top tier and New York State residents have the fewest slots per capita of any state with a veterinary college. Our effort to modestly increase the size of our pre-clinical classes has enabled the College to secure capital funding for much needed improvements in our educational facilities. With commitments from New York State of over \$80M, we are on the cusp of launching the most extensive enhancement of the College's capital plant since our new hospital was constructed in the early 1990's. The project will create new classrooms, student locker rooms, a simulation center, and learning resources, and renovate much of Schurman Hall constructed in 1957, including anatomy and student surgery. At the completion of the project we will increase Cornell's pre-clinical class size to match our hospital's capacity (about 120 students), while phasing out the clinical training of students from Ross and St. George's veterinary colleges, such that we will graduate roughly the same number of students currently obtaining clinical training in our hospital. The academic profile of our entering students (GPA/GRE) and the employment rate and starting salaries of our graduates remain among the strongest in the country and demonstrate the demand for and value of a Cornell veterinary education. Cornell admissions continue to be extraordinarily competitive, with a 16% increase in applications last year and an admission rate of less than 11%.

REVENUE ENHANCEMENT

Our financial position remains challenging due to reductions in state funding, pressure on federal grants, and our policy to constrain tuition increases. We will end FY2014 with a slight central college deficit, which has been reduced by the most successful year of philanthropy in the College's history. Our capital program has generated enormous excitement and major philanthropic support, including the naming of the stunning new Atrium, as well as new classrooms and laboratories. We are enormously grateful for the support that has led to more than \$20M in gifts and commitments in FY2014, ensuring our ability to preserve Cornell's academic strength. The College has also benefitted from revenue associated with our clinical initiatives, and corporate and academic partnerships. Cornell University Veterinary Specialists in Stamford CT ended its third year in operation with a truly amazing record of growth, and returned a revenue dividend to the College for our academic investment. Veritas, our rapidly growing Continuing Education partnership between Cornell, Zoetis, and Texas A&M, has also taken major strides this year, launching an industry leading program of web-based continuing education for veterinarians, veterinary technicians and other paraprofessionals.

A NEW CLINICAL INITIATIVE

Cornell Ruffian Equine Specialists (CRES) opened this spring in Elmont, NY, across the backstretch from Belmont Park. A referral and emergency equine hospital, CRES is a 26,000 square foot facility, has 29 stalls, two surgery suites, two imaging rooms, and treatment and recovery stalls. Three College faculty from the Ithaca campus practice at CRES, while two additional surgeons have been hired full-time, expanding its capacity for 24-7 emergency and critical care. CRES has significantly enhanced equine surgical options in the area, raised our profile in equine medicine and surgery, and serves as a critical emergency facility for horse owners on Long Island. Drs. Sam Hurcombe and Kyla Ortved join Chief Medical Officer Alan Nixon and renowned surgeons Drs. Norm Ducharme and Lisa Fortier in establishing this important center for equine sports medicine and surgery.

GLOBAL INITIATIVES

This year our collaboration with Hong Kong's City University resulted in the establishment of a new veterinary school in Hong Kong. Launched this spring, the City University School of Veterinary Medicine, in collaboration with Cornell University, will initially focus on graduate education of veterinarians in Hong Kong and China, and will build to a Bachelors of Veterinary Medicine program over the next several years. We have entered an agreement to assist City University in developing those programs over the next 10 years, and City University is currently searching for a founding Dean of the new Veterinary School, who will work with Cornell to build a center of excellence in animal health in Asia.

ACADEMIC STATURE

Cornell has been ranked as the top College of Veterinary Medicine by peer assessment (U.S. News and World Report) since 2000. This ranking reflects the strength of our DVM training program, as well as the breadth and quality of our research. We rank first in citations per faculty and citations per article, direct measures of the impact of our scholarly output, among all veterinary colleges. While the alignment of academic departments within veterinary colleges is imperfect, comparison metrics of our departments place them in an outstanding position relative to those of our peer veterinary colleges (Clinical Sciences – 2nd; Population Medicine & Diagnostic Sciences – 1st; Microbiology & Immunology – 1st). Moreover, the pre-clinical departments (Microbiology & Immunology, Molecular Medicine, and Biomedical Sciences) rank well when compared to all similar departments, mostly at colleges of medicine.

RESEARCH INITIATIVES

Cornell geneticists have completed the largest canine genotyping yet undertaken, using a semi-custom genotyping platform developed at Cornell. With initial support from Zoetis, 4,200 dogs from Cornell's DNA Bank of over 12,000 samples of clinically characterized patients or controls were genotyped to identify genetic associations with a range of diseases. The project yielded a number of new genetic variations linked with diseases shared by dogs and people. The College is currently exploring partnerships to develop tests that will offer this technology to the public.

A five-year, \$10 million Specialized Research Center grant from the National Institutes of Health (NIH) will help scientists from across campus tackle the roots of reproductive issues and train the next generation of reproduction scientists. With the grant, Cornell has established a new Center for Reproductive Genomics (CRG), joining a national network of similar centers connecting basic and clinical reproductive scientists. Directed by Dr. Paula Cohen, Professor of Genetics in the Department of Biomedical Sciences, the CRG includes clinical reproduction

specialists at Weill Cornell Medical College and will investigate how a recently discovered class of molecules called "micro RNAs" influences meiotic errors – the genetic basis of reproductive disorders and birth defects. The team will translate basic research discoveries into clinical innovations to help diagnose and treat infertility and birth defects.

Finally, in collaboration with Weill Cornell Medical College, the College has formed a joint hematologic cancer program that combines each College's strengths in genomics, oncology, and therapeutics. The Center has begun to jointly recruit cancer scientists and will use a comparative approach to advance cancer therapy in human and canine patients. Therapeutic trials in dogs with lymphoma will be used to discover lymphoma subtypes that are responsive to next generation drugs, and lymphoma sequencing in dogs will guide future canine therapies. Joint clinical trials in dogs and humans will establish a major structural link between scientists on both campuses.

There are many more exciting teaching, clinical, and research initiatives underway, but I am pleased to share these snapshots as we approach Cornell's Sesquicentennial year. Our wealth of talent, assets, discoveries, and community continues to inspire me in my role as dean and fuel our collective success. I look forward to working with all of you to continue our momentum in the years to come.

Cordially,



Michael I. Kotlikoff, VMD, PhD
Austin O. Hooley Dean of Veterinary Medicine

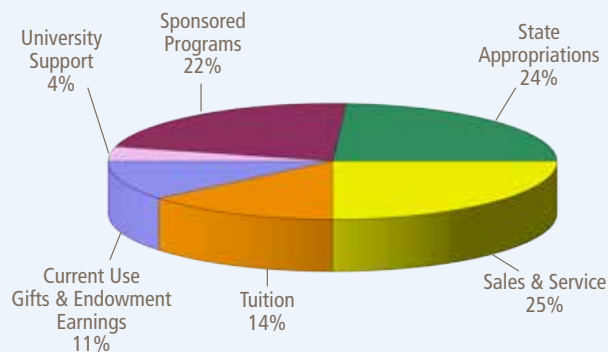
financial report

COLLEGE OF VETERINARY MEDICINE FISCAL 2013-2014

The College ended fiscal year 2014 on June 30 with expenses exceeding revenues by \$90.8 thousand. Revenues totaled \$146.46 million and expenses totaled \$146.55 million. During Fiscal 2014, there were significant university budget model changes distributing shared revenues and associated costs. Tuition revenues increased 20% or \$3.4 million due primarily to a distribution of undergraduate tuition. Sales and service revenue increased approximately 8% or \$2.7 million and gifts and investment income increased 25% or \$3.2 million with the receipt of significant gifts. Availability of research funding continues to be constrained, resulting in a decline of 5% or \$1.9 million in sponsored program revenues. Total expenditures increased by \$18.5 million from the prior year primarily due to the university budget model distribution of costs. Of these costs, the most significant increases were associated with utility and maintenance costs, increased \$8.5 million, and university allocated costs, increased \$7.7 million.

The College financial plan for fiscal year 2015 shows expenses exceeding revenues by \$2.4 million. This projected spending deficit consists of a \$1.1 million annual operating shortfall plus a planned use of \$1.3 million of gifts, service revenues, and other funds accumulated from prior years. The major contributing factors include a continued decline in the amount of indirect cost recoveries on sponsored research funding, flat funding from New York State, salary improvement costs, and startup costs associated with new faculty hires.

REVENUES

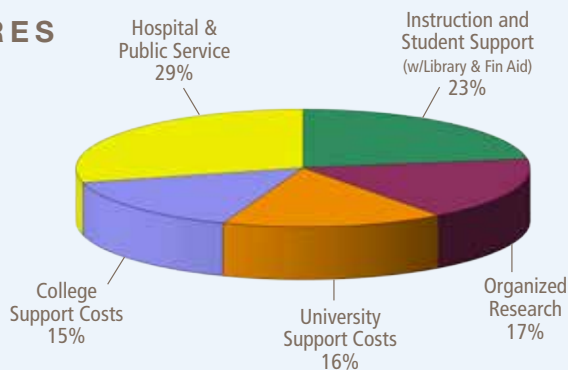


REVENUES

Sponsored Programs	\$ 32.5	22%
State Appropriations	\$ 34.3	24%
Sales & Service	\$ 36.9	25%
Tuition	\$ 20.4	14%
Gifts & Endowment Earnings	\$ 16.2	11%
University Support	\$ 6.2	4%

Fiscal 2014 Operating Revenues **\$146.5 million**

EXPENDITURES

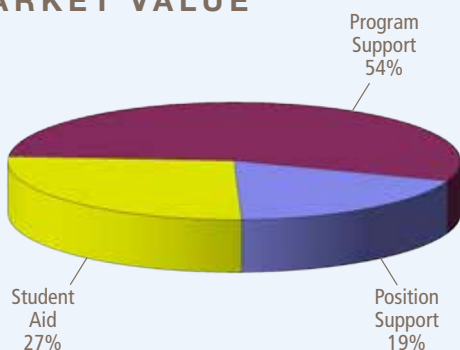


EXPENDITURES

Hospital & Public Service	\$ 43.0	29%
Instruction and Student Support (w/Library & Fin Aid)	\$ 33.4	23%
Organized Research	\$ 24.1	17%
University Support Costs	\$ 23.4	16%
College Support Costs	\$ 22.6	15%

Fiscal 2014 Operating Expenditures **\$146.5 million**

ENDOWMENT MARKET VALUE



ENDOWMENT MARKET VALUE

Program Support	\$ 109.3	54%
Position Support	\$ 38.0	19%
Student Aid	\$ 53.6	27%

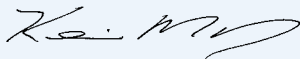
Fiscal 2014 Endowment Market Value **\$200.9 million**

GIVING REPORT

Thanks to nearly 5,300 donors, the College had its best fundraising year ever with new gifts and commitments totaling \$23 million. Your generous gifts make possible our work to educate veterinarians and offer hope and cure to animals and people.

For providing the margin of excellence that makes Cornell the top ranked college of veterinary medicine in the country, we offer our sincere gratitude. THANK YOU!

With appreciation,



Kevin Mahaney
Assistant Dean for Alumni Affairs
and Development

ensuring the future

New endowment funds established in 2013-2014

Sandra Atlas Bass Endowment for
Cancer Research

Howard and Erica Evans Scholarship

Catherine Violet Hubbard Scholarship

William Kaplan Professorship

Veterinary Alumni Association Fund for
Expanding Horizons

ANNUAL GIFTS

\$3.2 Million

Gifts to the Cornell Fund for the College of Veterinary Medicine and unrestricted gifts to the Baker Institute for Animal Health, Feline Health Center, and the Cornell University Hospital for Animals support student aid, provide start-up funds for new faculty, and contribute to innovation through research and improved patient care.

ENDOWMENTS

\$7.1 Million

Gifts to support student aid, research and faculty positions added to the long-term investment pool of Cornell University provided permanent income to support the College's mission.

RESTRICTED GIFTS

\$12.7 Million

Gifts designated by donors to be used for specific programs and services provided critical funds to advance teaching, research and service.

TOTAL NEW GIFTS AND COMMITMENTS

\$23.0 Million

SOURCES OF GIFTS

Friends and Clients	\$12.9 Million
Alumni	\$4.6 Million
Corporations and Foundations	\$2.9 Million
Other stakeholders	\$2.6 Million

cayuga society

During the past year, the following people have shared with us that they have included the College of Veterinary Medicine in their estate plans:

Anonymous (3)

Mrs. Marilyn Abbott

Mr. Vincent Alukonis and Mr. Stephen Schreuder

Dr. Richard Basom '44

Dr. Roger W. Batchelder '46

Ms. Denise Clolery

Dr. Alexander de Lahunta '58, PhD '63

Mrs. Samantha Glen

Mr. George R. Goldner and Ms. Nancy Kreig

Mr. David F. Gregorski

Dr. Joseph E. Paddock '52*

Mrs. Jane C. Ponty

Dr. Raymond S. Pray '61 and Mrs. Prudence Pray

Dr. Clifford MS '83, PhD '86 and Mrs. Linda Rossi

Marilyn Vail, PhD '78

Dr. Robert M. Wainwright '52

Dr. Tina L. Waltke '07 and Mary Jane Constant

*deceased



awards and contracts

FY 13/14 - ANNUAL AWARD BUDGET

NAME	SPONSOR	TITLE	ANNUAL BUDGET
Administration			\$183,928
Joel Baines	NIH	Cornell University Veterinary Investigator Program	\$48,017
Joel Baines, Colin Parrish	NIH	Veterinary Student Training in Biomedical Research	\$135,911
Animal Health Diagnostic Center			\$8,624,137
Bruce Akey	DHHS-Food & Drug Administration	Animal Feed and Pet Food Safety Cooperative Agreement with the FDA-VLRN Supplement	\$2,500
Bruce Akey	NYS Department of Agriculture and Markets	Avian Influenza Surveillance Testing (LPAI)	\$165,700
Bruce Akey	NYS Department of Agriculture and Markets	National Animal Health Laboratory Network	\$166,000
Bruce Akey	NYS Department of Agriculture and Markets	Funding for Core Programs and QMPS	\$6,943,000
Bruce Akey	USDA-APHIS	Classical Swine Fever Surveillance	\$23,694
Bruce Akey	USDA	National Animal Health Laboratory Network: New York	\$182,000
Edward Dubovi	International Duck Research Cooperative, Inc.	International Duck Research Cooperative	\$329,816
Edward Dubovi	NYS Dept of Environmental Conservation	Zoonotic & Wildlife Disease Diagnostic Testing in New York State	\$767,435
Edward Dubovi	USDA-APHIS	Conduct Serum Neutralization Assays on Animal Serum Samples to Determine Levels of Canine Distemper and Canine Adenovirus Antibodies	\$13,992
Edward Dubovi	USDA-APHIS	Analyze Serum Samples from Raccoons for Virus Neutralizing Antibodies to Canine Distemper	\$30,000
Baker Institute of Animal Health / Feline Health Center			\$2,775,726
Andrew Allison, Colin Parrish	NIH	Host Cell Receptor Variation and the Control of Viral Cross-species Transmission and Epidemic Emergence	\$53,942
Douglas Antczak	Morris Animal Foundation	Genetic Studies of Equine Sarcoid Tumors	\$50,000
Douglas Antczak, Andrew Clark	Qatar Foundation-Qatar University	Comparative Genetics of Complex Diseases	\$69,931
Judith Appleton	Cornell Atkinson Center for a Sustainable Future	Small Molecules as Targets in Control of Nematode Infections in Animals and People	\$67,212
Margaret Brosnahan, Douglas Antczak	NIH	Immune Tolerance to Serial Trophoblast Transplants	\$131,718
Gerlinde Van De Walle, Eric Ledbetter, Michele Edelmann	Research Grants Program in Animal Health	The Air-Liquid Canine Corneal Organ Culture System: A New Tool to Study the Pathogenesis of Acute Alphaherpesvirus-Induced Ocular Disease	\$47,985
Vicki Meyers-Wallen	NIH	Identification of XX DSD Mutations by RNA-seq and Comparative Genomics	\$77,500
John Parker	Cornell Feline Health Center	Mechanisms of Feline Calicivirus (FCV) Infection of Polarized Epithelial Cells	\$50,000
John Parker	NIH	Short Term Training of Students in the Health Professions	\$59,022
John Parker	NIH	Studies of the Global Translational Response to Human Virus Infection	\$216,788
John Parker	Winn Feline Foundation	Identifying the Role of Allelic Variations of Feline Junctional Adhesion Molecule A in Susceptibility / Resistance to Feline Calicivirus Infection	\$170,174
John Parker	Morris Animal Foundation	The Role of Feline Junctional Molecule A in Feline Calicivirus (FCV) Infection	\$78,516
Colin Parrish	NIH	Structural Controls of Functional Receptor and Antibody Binding to Viral Capsids	\$386,210
Colin Parrish	NIH	The Evolutionary and Biological Bases of Host Switching in Viruses	\$337,455
Alexander Travis, Roy Cohen	NIH	Nanoscale Energy Production for Implantable Medical Devices	\$739,431
Alexander Travis, Roy Cohen	Weill Cornell Medical Center	Developing a Multiplex Point-of-care Platform to Detect Multiple Stroke Biomarkers	\$39,791
Gerlinde Van De Walle, Scott Coonrod	Cornell Feline Health Center	Peptidylarginine Deiminase (PAD) Inhibitors: A Novel Class of anti-Cancer Drugs for Feline Mammary Cancer	\$50,000
Gerlinde Van De Walle	Cornell Cancer Biology Pilot Research Program	The effects of tumor-inducing stimuli on oncogenic transformation of mammary stem cells (MaSC) from	\$8,480
Gerlinde Van De Walle	Morris Animal Foundation	species with variable susceptibility for mammary cancer	\$17,550
Gerlinde Van De Walle, Scott Coonrod	Morris Animal Foundation	The Role of Citrullination in Canine Cancer Stem Cells: Opportunities for Novel Anti-tumor Strategies and Biomarker Development	\$110,022
Gerlinde Van De Walle	Cornell Stem Cell Program	Towards Cell-free Regenerative Therapies: Characterization of the Equine Mesenchymal Stem Cell (MSC) Secretome	\$13,999

Biomedical Sciences
\$7,111,995

Klaus Beyenbach	Ohio State University (FNIH)	High-throughput Discovery of Chemicals that Induce "Kidney" Failure in the Malarial Vector <i>Anopheles gambiae</i>	\$120,394
Adam Boyko	University of Washington	Companion Dogs as a Model System for Aging Research	\$37,970
Adam Boyko	NIH-University of Michigan	Comprehensive Characterization of Canine Genomic Structural Diversity	\$148,698
Adam Boyko	Cornell Center for Advanced Technology	Variation Discovery Towards Fine-mapping Dog Disease Traits	\$48,390
Paula Cohen	NIH	Small RNA Pathways in Mammalian Gametogenesis	\$1,540,000
Paula Cohen	NIH	Genetic Pathways Effecting Crossover Control and Meiotic Recombination in Mammals	\$289,032
Bethany Cummings	UC Davis	Dissecting Mechanism by Which GI Surgery Delays Diabetes Onset in UCD-T2DM Rats	\$82,296
Bethany Cummings	Cornell Cancer Biology Pilot Research Program	Efficacy of Vertical Sleeve Gastrectomy Surgery to Prevent the Development of Hepatic Cancer in High Fat Fed Liver-specific p53 Knockout Mice	\$10,000
Bethany Cummings	Georgia Regents University	Role of TGR5 in the Metabolic Benefits Observed After Sleeve Gastrectomy Surgery	\$75,000
Robin Davisson	NIH-Weill Cornell Medical College	Forebrain Plasticity in Hypertension: Project 1	\$89,688
Bethany Cummings	US Highbush Blueberry Council	Efficacy of Blueberry Consumption to Prevent or Delay the Onset of Type2 Diabetes in a Novel Rodent Model of Type 2 Diabetes, the UCD T2DM Rat	\$37,785
Robin Davisson	NIH-Weill Cornell Medical College	Forebrain Plasticity in Hypertension: Core D	\$76,014
Robin Davisson	University of Iowa (NIH)	PPG-Genetic and Signaling Mechanisms in the Central Regulation of Blood Pressure (Project 1)	\$267,297
Robin Davisson	NIH	Oxidant Stress in the Brain and Hypertension	\$434,136
Kurtis Feng, David Lin	National Science Foundation	Elucidating the 3D Structure of the Herpes Simplex Virus Type-1 DNA Packaging Motor	\$40,500
Joanne Fortune	USDA-Federal Formula Funds	Effects of Endocrine Disrupting Chemicals (Estrogens) on Bovine Ovaries	\$30,000
Joanne Fortune	USDA-Federal Formula Funds	Ovarian Influences on Reproductive Success in Ruminants	\$30,000
Jennifer Fricke, David Lin	National Science Foundation	The Impact of Toxoplasma Activated STAT3 on Host Immune Defenses	\$40,500
John Hermanson, Elizabeth Buckles	USDA-Federal Formula Funds	Population Dynamics, Habitat Selection, Feeding Behavior and Guano Analysis of Brown Bats in Central New York	\$29,768
Joanna Holloway	NIH	Functional Analysis of the Dual Specificity Kinase NEK1 in Mammalian Meiosis	\$366,267
Sergiy Libert	Cornell Center for Vertebrate Genomics	Identification of SIRT6 Targets Responsible for the Induction of Apoptosis in Cancer Cells	\$15,000
David Lin	Research Grants Program in Animal Health	Pcdh19 Function in Axon Guidance and Epilepsy	\$25,556
Heinrich Lob, Mark Roberson	American Heart Association-National	Central Mechanisms of Angiotensin-dependent Hypertension: NADPH Oxidase Isoforms and Endoplasmic Reticulum Stress	\$77,000
Michael Kotlikoff	University of Vermont (NIH)	Calcium Signaling in the Cerebrovascular Unit in Health and Disease	\$36,652
Andrew Miller	Boston College	Monocyte/Macrophage Traffic and Peripheral Nerve Pathogenesis	\$16,800
Andrew Miller	Cornell Cancer Biology Pilot Research Program	Immunophenotypic Characterization of the Immune Cell	\$8,781
Elizabeth Moore, Robert Weiss	Cornell Residents Research Grants Program	Microenvironment in Canine Glial Tumors	\$7,975
Elizabeth Moore, Robert Weiss	Cornell Residents Research Grants Program	Roles of p53 in Protecting Against Fatty Liver Disease and Hepatic Tumorigenesis	\$9,998
Alexander Nikitin	Internal Seed Grants for Collaboration	Discovery of Cancer-specific Synthetic Lethal Pathways	\$50,000
Alexander Nikitin	New York State Department of Health-NYSTEM	Roles of Ovarian Surface Epithelium Stem Cells	\$337,191
Rohit Rajoria, David Lin	Cornell Residents Research Grants Program	Determining the Functional Significance of Protocadherin 19 in Autism	\$10,000
Mark Roberson, Paula Cohen	NIH	Reproductive Biology and Genomics Training Program	\$170,174
John Schimenti	NIH	Evaluation of NF1 as a Major Breast Cancer Driver	\$196,207
John Schimenti	NIH	Genetics of Meiosis and Recombination in Mice	\$313,893
John Schimenti	NIH	Research and Career Training in Vertebrate Developmental Genomics	\$129,372
Bhupinder Singh	American Association for Laboratory Animal Science	Comparison of Firocoxib, Meloxicam, and Buprenorphine Analgesia in Rats	\$5,192
Marcus Smolka, Robert Weiss	NIH	Cellular Responses to DNA Replication Stress	\$220,000
Susan Suarez	NIH	Physical and Chemical Cues that Guide Sperm Migration	\$279,542
Susan Suarez	Genex Cooperative, Inc.	The Fate of Bull Sperm Storage Proteins During Capacitation of Frozen-thawed Sperm	\$6,038
Robert Weiss	NIH	(PQD2) Molecular Basis for the Chemosensitivity of Testicular Germ Cell Cancers	\$168,563
Robert Weiss	NIH	Genome Maintenance by the Mouse HUS1 Checkpoint Gene	\$135,970
Robert Weiss	Internal Seed Grants for Collaboration	Sirt2 as A New Target for Treating Triple Negative Breast Cancer	\$49,994
Robert Weiss	Cornell Center for Vertebrate Genomics	X-Ray Power Source for Live Small Animal Micro-CT Imaging System	\$11,771
Robert Weiss, Hening Lin, Richard Cerione	NIH	Succinylation and Malonylation as Novel Protein Modifications in Cancer	\$184,941

Marcus Wilkes, David Lin	National Science Foundation	The Role of the P2X7 in Activating Kinase Pathways Associated with Cancer	\$40,500
Charles Wisler, David Lin	National Science Foundation	Down-Regulation of Hsp27 Leads to Granuloma Devascularization and Mycobacterium Tuberculosis Release	\$40,500
Andrew Yen	New York State Department of Health-NYSTEM	Flow Cytometry Core Laboratory to Support Stem Cell Research	\$76,625
Andrew Yen	NIH	Mechanism of Action of Retinoic Acid Using CD38	\$305,862
Andrew Yen	NIH	Nutritional Cell Cycle and Differentiation Control	\$236,100
Colin Young	NIH	Role of Central Neural NFkB and ER Stress Obesity-Induced Hypertension	\$87,112
Colin Young, Robin Davisson	American Heart Association - National	Dissecting the Role of Brain NFkB in Obesity-Induced Hypertension	\$23,451
Colin Young, Robin Davisson	American Physiological Society	Dissecting the Role of Endoplasmic Reticulum Stress and NFkB Activation in Neurogenic Hypertension	\$41,500

Clinical Sciences

\$4,008,927

Dorothy Ainsworth	Harry M. Zweig Memorial Fund for Equine Research	Fine Mapping of Candidate Genes Contributing to Equine Left Recurrent Laryngeal Neuropathy (RLN)	\$45,828
Jordyn Boesch, Alvaro Cisternas	Research Grants Program in Animal Health	Cardiopulmonary Effects of Medetomidine in White-Tailed Deer (<i>Odocoileus virginianus</i>)	\$37,424
Marta Cercone, Jon Cheetham, Normand Ducharme	Med-El World Wide Headquarters	Laryngeal Pacemaker in Horses: Postdoctoral Research Discovery Award	\$47,693
Jon Cheetham	Med-El World Wide Headquarters	Laryngeal Pacemaker in Horses: Research Discovery Career Award	\$141,192
Jon Cheetham	University of Pittsburgh (NIH)	A Regenerative Medicine Approach for TMJ Meniscus Restorations: Temporomandibular Joint Meniscus Replacement Pig Model GLP	\$172,298
Jon Cheetham, Bryan Brown, Samantha Nelson	Research Grants Program in Animal Health	Restoring Function in Dogs with Laryngeal Paralysis	\$39,141
Jon Cheetham, Normand Ducharme	Med-El World Wide Headquarters	Neuroprosthesis in Horses: Laryngeal Soft Palate and Pulmonary Targets: Program Support	\$186,100
Jon Cheetham	NIH	Manipulating Macrophage Phenotype in Laryngeal Nerve Repair	\$159,222
Jon Cheetham	NIH	Temporomandibular Joint Meniscus Replacement	\$21,272
Thomas Divers, Bud Tennant	USDA-Federal Formula Funds	Etiology of Acute Equine Hepatitis	\$13,000
Thomas Divers, Bud Tennant	Harry M. Zweig Memorial Fund for Equine Research	Etiology and Prevention of Equine Serum Hepatitis (Theiler's Disease)	\$67,000
Thomas Divers, Rolfe Radcliffe	OXYVITA, Inc.	Pilot Study: Polymeric Hemoglobin	\$12,343
Normand Ducharme	Harry M. Zweig Memorial Fund for Equine Research	An Exploratory Study into the Practical Application of a Regenerative Medicine Approach to Reconstruction of the Equine Upper Airway	\$96,977
Michele Edelmann, Eric Ledbetter	Cornell Residents Research Grants Program	Autologous Platelet Rich Plasma Corneal Ulcers	\$9,859
M. Julia Felipe	NIH	Epigenetics: A Novel Approach in Primary Immunodeficiencies	\$462,000
M. Julia Felipe, Rebecca Tallmadge-Ingram	USDA-AFRI	Advancing Neonatal Vaccination Strategies: A Molecular Approach to Monitor Immune Responses	\$131,501
Daniel Fletcher	American Association of Zoo Veterinarians	Population Pharmacokinetics of Orally Administered Epsilon Aminocaproic Acid in Juvenile Elephant Seals (<i>Mirounga angustirostris</i>)	\$9,895
Daniel Fletcher	Cornell Feline Health Center	Modulation of Fibrinolysis and Coagulation by Omega-3 Fatty Acid Supplementation in Cats: A Potential Novel Prophylactic Therapy for Arterial Thromboembolism	\$45,402
Daniel Fletcher, April Blong, Joseph Wakshlag	Waltham Foundation	Long Chain Omega-3 Fatty Acids: A Potential Prophylactic Therapy for Dogs at Risk of Thromboembolism	\$24,992
Lisa Fortier	Hospital for Special Surgery	Development of Fiber-Reinforced Meniscal Replacement	\$30,205
Lisa Fortier	Arthrex Inc.	Extended Evaluation of Arthrex BioCartilage in an Equine Model	\$43,411
Lisa Fortier	Harry M. Zweig Memorial Fund for Equine Research	Cellular Biomarkers of Early Cartilage Injury Measured with Multiphoton Imaging	\$52,696
Lisa Fortier	Columbia University	Knee Meniscus Regeneration	\$180,223
Lisa Fortier, Joel Baines	New York State Department of Health-NYSTEM	Stem Cell Training of Veterinary Students to Foster the Development of Cross-trained Stem Cell Scientists in New York State	\$76,617
Robert Gilbert	USDA-Federal Formula Funds	Cervicitis as a Component of Postpartum Reproductive Disease in Dairy Cows	\$30,000
Robert Gilbert	Harry M. Zweig Memorial Fund for Equine Research	Effect of Early Pregnancy on Function of the Equine Corpus Luteum	\$49,350
Robert Goggs, Daniel Fletcher	American College of Veterinary Emergency & Critical Care Foundation (VECCF)	Multicenter in vitro TEG-ROTEM® Standardization	\$11,017
Kelly Hume	Cornell Cancer Biology Pilot Research Program	A Phase II Investigation of Doxycycline for Canine Bcell Lymphoma	\$10,000
Ariane Jay-Silva, James Flanders	Cornell Residents Research Grants Program	Biomarker Quantification to Identify Malignant Etiology in Dogs with Hemoperitoneum and a Splenic Mass	\$9,510
Sarah Kaye, Daniel Fletcher	Cornell Residents Research Grants Program	Coagulation and Fibrinolysis in Healthy and <i>Otostrongylus</i> -infected Elephant Seals	\$9,913

Sonya Lawlis, Soon Hon Cheong, Susan Suarez	Cornell Residents Research Grants Program	Potential Advancements with in vitro Fertilization by the Use of Viscous Media	\$9,535
Elizabeth Leach, Ursula Krotscheck	Cornell Residents Research Grants Program	Effect of TPLO on Long-term Stifle Loading Patterns in the Dog	\$10,000
Eric Ledbetter, Lucen Vallone	Research Grants Program in Animal Health	Effects of Topical Ophthalmic Ganciclovir in Dogs with Experimental Recurrent Ocular Canine Herpesvirus-1 Infection	\$16,420
N. Sydney Moise	American Kennel Club Canine Health Foundation	Mitral Valve Leaflet Strain in Dog Breeds at Risk for Myxomatous Mitral Valve Degeneration	\$29,384
N. Sydney Moise	American Kennel Club Canine Health Foundation	Mitral Valve Leaflet Strain in Dog Breeds at Risk for Myxomatous Mitral Valve Degeneration	\$36,881
Alan Nixon	Harry M. Zweig Memorial Fund for Equine Research	Osteoarthritis Control Through Combinatorial Stem Cell Therapy	\$80,147
Alan Nixon	Harry M. Zweig Memorial Fund for Equine Research	Evaluation of Lubricin as a New Biotherapeutic for Equine Joint Disease	\$173,259
Alan Nixon	GeneQuine Biotherapeutics	A Preliminary Trial of Helper-Dependent Adenovirus Delivered Equine IL-1ra for the Treatment of Traumatic Osteoarthritis in an Equine Model	\$307,932
Kira Novakofski, Lisa Fortier	Weill Medical College- CTSC	Cellular Biomarkers of Early Cartilage Injury Measured with Multiphoton Imaging	\$27,232
Eva Oxford, N. Sydney Moise	American College of Veterinary Internal Medicine Foundation	Identification of Genetic Mutations Associated with the Development of Degenerative Mitral Valve Disease in the Small Breed Dog	\$8,500
Robin Radcliffe	Morris Animal Foundation-Wildlife Health Studies	Hemorrhagic Septicemia Surveillance in Buffalo as an Aid to Range Expansion of the Javan Rhinoceros	\$50,000
Robin Radcliffe, M. Julia Felipe	US Fish and Wildlife Service	Managing Disease Risks and Improving Livestock Health to Secure the Future of the Endangered Javan Rhinoceros	\$36,899
Robin Radcliffe, M. Julia Felipe	John T. and Jane A. Wiederhold Foundation	The Ecological Drivers of Anthrax Infection: Integrating Conservation Medicine and Veterinary Student Training as Part of a Comprehensive Rhino Health Unit in Indonesia	\$24,635
Rolfe Radcliffe	Harry M. Zweig Memorial Fund for Equine Research	En Bloc Removal of Intravascular Thrombi via an Extracorporeal Bypass Circuit in Experimentally Induced Jugular Thrombosis in Horses	\$10,000
Daniel Sakai, Manuel Martin-Flores	Cornell Residents Research Grants Program	Neuromuscular Block and Laryngeal Function in Anesthetized Dogs	\$7,600
Kenneth Simpson	NIH-Weill Cornell Medical College	Mechanisms of Host-bacterial Interactions, Ileitis and Granuloma Formation in Agr2 -/- Mice	\$58,922
Kenneth Simpson	University of North Carolina (NIH)	Colitis Induced by Immune Responses to Luminal Bacteria	\$137,884
Kenneth Simpson, Adam Boyko	AKC	Granulomatous Colitis in Boxer Dogs and French Bulldogs: Mapping of Disease Associated Loci and Functional Analysis of Bacterial Killing	\$187,730
Rebecca Tallmadge-Ingram	Harry M. Zweig Memorial Fund for Equine Research	T-Cell Mediated Immunity and Vaccine Development in Horses	\$50,000
Rory Todhunter, Adam Boyko, Marta Castelhana	Cornell Feline Health Center	Genetic and Genomic Resources for the Cat	\$50,000
Gabriela Wagner, Robin Radcliffe	American Humane Association	Orthopedic and Dental Morphometric Analysis of the Critically Endangered Javan Rhinoceros (<i>Rhinoceros sondaicus</i>)	\$4,000
Joseph Wakshlag	USDA-Federal Formula Funds	Insulin Resistance in Transition Dairy Cows: Characterization and Control Measures to Increase Health and Production	\$20,000
Joseph Wakshlag	Terumu Medical Corporation	Canine RPR System	\$32,053
Joseph Wakshlag	Hills Pet Nutrition, Inc.	Effect of Iodine Restricted Diet on Clinical Outcome and Client Satisfaction in Severely Affected Hyperthyroid Cats	\$43,465
Joseph Wakshlag	i4c Innovations Inc	Canine Heart Rate/Pulmonary UWB Monitoring System-V/alpha Test	\$48,741
Joseph Wakshlag	Royal Canin	Dietary Interventions in Disease	\$154,892
Joseph Wakshlag	USDA-AFRI	Ketosis and Insulin Resistance in Transition Dairy Cows: Characterization and Control Measures to Increase Health and Production	\$166,735

Microbiology & Immunology

\$6,079,103

Avery August	Cornell Center for Vertebrate Genomics	Generation of Condition and Inducible Deletions of the Actin Binding Protein Drebrin Mutant in Mice	\$14,697
Avery August	NIH	Cornell University BEST Training Program	\$375,875
Joel Baines	NIH	Nucleocapsid Envelopment Herpes Simplex Virus-1	\$348,914
Paul Bowser	NYS Dept. of Environmental Conservation	Fish Pathology Diagnostic Services	\$50,077
Paul Bowser, James Casey	USDA-Federal Formula Funds	Signals for Climate Change: Quantifying Asian Carp Invasion	\$29,733
Paul Bowser	USDA-FFF-Animal Health - CUAES	A National Agricultural Program for Minor Use Animal Drugs	\$72,538
Margaret Bynoe	NIH	Brain Endothelial Cell Function Under Adenosine Receptor Signaling Directive	\$426,789
Theodore Clark	NIH	A Resource Center for Tetrahymena Thermophila Supplement	\$94,955
Eric Denkers	NIH	Role of DC WNT/BETA-Catenin Signaling in Toxoplasma Infection	\$232,500
Rodman Getchell	John T. and Jane A. Wiederhold Foundation	Scholarship Support for AQUAVET Training Program	\$6,186
Rodman Getchell	USDA-FFF-Animal Health - CUAES	Is Viral Hemorrhagic Septicemia Limiting Muskellunge Abundance in the Thousand Islands	\$86,000

Rodman Getchell	DHHS-Food & Drug Administration	The Safety of Strontium Chloride as a Skeletal Marking Agent for Pacific Salmon	\$38,605
Nikolaus Osterrieder	Harry M. Zweig Memorial Fund for Equine Research	T-Cell Mediated Immunity and Vaccine Development in Horses	\$50,000
Brian Rudd	NIH	Mechanisms Limiting Neonatal Immunity	\$385,960
Brian Rudd	NIH	Neonatal Infections and Memory T cell Repertoire	\$225,326
Brian Rudd	NIH	Regulation of Neonatal Immunity by Irf-7/Lin28	\$384,733
Brian Rudd	Cornell Stem Cell Program	Determining the Role of Stem Cells in the Maintenance of Immunity	\$9,000
Brian Rudd	Weill Cornell Medical Center	Using T-cell Repertoire as a Biomarker for Congenital HCMV Disease	\$39,965
David Russell	Bill & Melinda Gates Foundation	Novel High-Throughput Drug Screens for Inhibitors with Enhanced In Vivo Activity Against Mtb	\$484,716
David Russell	Celgene Corporation	Identification of Inhibitors of Malaria-Induced Inflammation	\$12,277
David Russell	NIH	Environmental Cues and Responses in Tuberculosis	\$436,534
David Russell	NIH	Restoration of Alveolar Macrophage Function in HIV Patients: A Clinical Study	\$476,373
David Russell	NIH	The Role of the Granuloma in M. tuberculosis Infection	\$424,098
David Russell	Michigan State University (NIH)	The Role of Monocytes in the Pathology of Severe Malaria	\$172,448
David Russell	Vertex	Development and Validation of Cell Based Assays for Assessing Mycobacterium tuberculosis (Mtb) Fitness in Macrophage Infection	\$276,540
Leon Toussaint, Margaret Bynoe	NIH	Brain Endothelial Cell Function Under Adenosine Receptor Signaling Directive, Diversity Supplement	\$96,495
Brian VanderVen	NIH	Analysis of Host-derived Nutrient Utilization Pathways in M. tuberculosis	\$193,750
Gary Whittaker	University of Rochester (NIH)	NIAID Centers for Excellence for Influenza Research and Surveillance	\$469,556
Gary Whittaker	Winn Feline Foundation	Characterization of Involvement of the FIPV Spike N-terminal Domain in Virus Binding and Entry	\$24,851
Gary Whittaker	Cornell Feline Health Center	Characterization of the in vivo Proteases Involved in Feline Coronavirus Infection and Development of FIP	\$49,710
Gary Whittaker	Cornell Feline Health Center	Single Particle Studies of Coronavirus Fusion for the Development of Anti-Fusogenic Antibodies as Potential FIP Therapeutics	\$49,902
Alan Zehnder, Avery August, Sara Hernandez, Marjolein Van Der Meulen	Sloan Foundation	Cornell Sloan Scholars Program	\$40,000

Molecular Medicine **\$4,788,049**

Richard Cerione	NIH	Characterization of Growth Factor-Coupled Signaling	\$323,673
Richard Cerione	NIH	Characterization of Growth Factor-Coupled Signaling: Administrative Supplements for Collaborative Science	\$133,822
Richard Cerione	NIH	Macromolecular Diffraction Resources: MacCHESS	\$2,301,474
Richard Cerione	NIH	Roles of CDC42 and its Signaling Partners in Cell Growth and Differentiation	\$306,900
Richard Cerione, Hening Lin, Robert Weiss	NIH	Succinylation and Malonylation as Novel Protein Modifications in Cancer	\$183,984
Richard Cooley, Holger Sondermann, Maurine Linder	NIH	Mechanism and Function of a Conserved Bacterial Cyclic-Di-GMP Receptor System	\$49,214
Laura Desrochers, Richard Cerione	NIH	The Role of Microvesicles in Promoting Cell Growth, Survival and Differentiation	\$38,712
Krista Giglio, Holger Sondermann	Weill Institute for Cell and Molecular Biology	Fleming Research Fellowship	\$48,000
Toshimitsu Kawate	NIH	Structure/Function of P2X Receptors: Ion Access Pathway and Selectivity Mechanism	\$233,223
Natasza Kurpios	NIH	Mechanisms Underlying Asymmetric Rotation and Vascular Development of the Midgut	\$330,950
Michael Lukey, Richard Cerione	Weill Institute for Cell and Molecular Biology	Fleming Research Fellowship	\$49,000
Robert Oswald	Claneil Foundation	Ensuring the Safety of Our Water and Food Supply Through Biologically Based Testing	\$75,000
Carolyn Sevier	NIH	Molecular Mechanisms to Maintain ER Redox Balance	\$288,222
Holger Sondermann	NIH	Molecular Mechanism Regulating Periplasmic Proteolysis in Bacterial Pathogenesis	\$386,719
Kelly Sullivan, Richard Cerione	NIH	Elucidating the Regulation of Mitochondrial Glutaminase in Cancer Progression	\$39,156

Population Medicine and Diagnostic Sciences **\$3,391,005**

Craig Altier	USDA-Smith Lever	CCE Department Program Support	\$2,500
Craig Altier	NIH-USDA	Regulation of Salmonella Virulence by Intestinal Fatty Acids	\$418,434
Erica Behling-Kelly, Daniel Fletcher, Midori Asakawa	Research Grants Program in Animal Health	Does Cholesterol Protect Blood Clots? Exploring the Inhibitory Effects of LDL on Fibrinolysis in the Dog	\$43,087
Elizabeth Berliner, Janet Scarlett	John T. and Jane A. Wiederhold Foundation	Shelter Outreach and Consultation Services: Special Projects in Animal Hoarding and Puppy Mill Breeding Operations	\$30,600

Rodrigo Bicalho	USDA-Federal Formula Funds	Decreasing Lameness in Dairy Cattle	\$30,000
Rodrigo Bicalho, Robert Gilbert	Texas A&M University (USDA)	Genomic Selection for Improved Fertility of Dairy Cows with Emphasis on Cyclicity and Pregnancy	\$86,143
Rodrigo Bicalho	Zoetis, Inc.	Recombinant Bovine IL-8 Therapy to Prevent Retained Placenta and Improve Uterine Health	\$74,980
Rodrigo Bicalho	Intervet Inc.	Study to Evaluate the Effect of Zuprevo on Incidence of Pneumonia and Otitis as well as Calf Survivability	\$95,326
Rodrigo Bicalho, Georgios Oikonomou, Ynte Schukken	USDA-AFRI	Dynamics of the Mammary Microbiota During and After Experimental and Natural Infection with Major Mastitis Pathogens	\$192,131
Karyn Bischoff Response Network	DHHS-Food & Drug Administration \$16,500	Animal Feed and Pet Food Safety Cooperative Agreement with the FDA-Veterinary Laboratory	
Marjory Brooks	Iowa State University	Immunoprofiling Canine ITP for Individualized Therapy	\$29,384
Marjory Brooks, Sally Ness	American Holistic Veterinary Medical Assoc Foundation	Investigating the Procoagulant Properties of Yunnan Baiyao in Horses	\$24,203
Marjory Brooks	Lilly Research Laboratories	Optimization of Preanalytic Variables to Detect Hypercoagulability in Rat Models	\$191,005
Yung-Fu Chang	Alopexx Vaccines, LLC	A Novel PNAG-tetanus Toxoid Conjugate Vaccine Against Actinobacillus pleuropneumoniae in Piglets	\$130,012
Yung-Fu Chang	Research Grants Program in Animal Health	Characterization of a Hypervirulent Strain of C. difficile (Ribotype 078)	\$47,075
Yung-Fu Chang	Eli Lilly and Company	Development of a Protein Based Vaccine Against Canine Leptospirosis	\$235,703
Yung-Fu Chang	USDA-Federal Formula Funds	Genomics Approach for Improved Diagnosis of food-borne pathogens	\$30,000
Allison Cowan, Elizabeth Berliner	Morris Animal Foundation - Vet Scholar Program	Growth, Disease, and Mortality in Shelter and Foster Kittens	\$4,000
Allison Cowan, Elizabeth Berliner, Jan Scarlett	American Humane Association	Growth, Disease, and Mortality in Shelter and Foster Kittens	\$4,000
Gloria Gioia, Paolo Moroni, Amy Glaser, Daryl Nydam	Safeguard Biosystems Holdings, Ltd	Microarray Development	\$87,808
Amy Glaser, Craig Altier, Elizabeth Buckles, Elizabeth Bunting,	USDA-Federal Formula Funds	Diagnostic Test Development and Strain Typing for Geomyces destructans in Bats and Exploration of Fungal Diversity in Bat Habitats	\$30,000
Yrjo Grohn	University of Nebraska (USDA)	Genome Wide Analysis of M. paratuberculosis Pathogenesis	\$13,193
Sabine Mann, Daryl Nydam	American Association of Bovine Practitioners	The Influence of Maternal Energy Status and Insulin Resistance on Bovine Colostrum Composition	\$4,000
Patrick McDonough	DHHS-Food & Drug Administration	Investigating Quality of Commercially Available Raw Meat Diets for Companion Animals	\$16,500
Hussni Mohammed, Yung-Fu Chang, Patrick McDonough,	USDA-FFF-Animal Health - CUAES	Whole Farm Dairy and Beef Systems: Gaseous Emissions, Management, Organic Production, and Pasture Based Production	\$30,000
Paolo Moroni, Francis Welcome	USDA-FFF-Animal Health - CUAES	Mastitis Resistance to Enhance Dairy Food Safety	\$30,000
Daryl Nydam, Thomas Overton	New York Farm Viability Institute, Inc.	Associations of Nutritional Strategy and Grouping Management During the Dry Period and Early Lactation with Biomarkers of Energy Metabolism and Inflammation, Health, Milk Yield, and Reproductive Performance of Dairy Cows on Commercial Dairy Farms	\$148,954
Daryl Nydam	Zoetis, Inc	Bovine Cryptosporidiosis Passive Protection Study	\$136,629
Daryl Nydam, Rory Todhunter, Adam Boyko, Thomas Overton	Research Grants Program in Animal Health	Efficiency of Metabolism Regulation During Negative Energy Balance and Heritability of Energy Related Metabolites in Transition Dairy Cows	\$45,875
Daryl Nydam	USDA-FFF-Animal Health - CUAES	Genomic Prediction of Transition Cow Metabolic Drivers for Selection of Productive Dairy Cattle	\$30,000
Daryl Nydam	USDA-Federal Formula Funds	Insulin Resistance in Transition Dairy Cows: Characterization and Control Measures to Increase Health and Production	\$20,000
Daryl Nydam	USDA-FFF-Animal Health - CUAES	Management Systems to Improve Economic and Environmental Sustainability of Dairy Enterprises	\$30,000
Daryl Nydam	USDA-Smith Lever	The Summer Dairy Institute: An Innovative Training Program for Young Veterinarians in Dairy Production Medicine	\$10,000
Brianna Pomeroy	Zoetis, Inc	Bovine Dendritic Cell Biology in Late Gestation	\$4,373
Vince Richards, Michael Stanhope	USDA-NIFA	Population Genomics of Streptococcus agalactiae from Infected Bovine and Fish Sources	\$73,318
Rebecca Sandler	Research Grants Program in Animal Health	Does Cholesterol Protect Blood Clots? Exploring the Inhibitory Effects of LDL on Fibrinolysis in the Dog	\$43,087
Ynte Schukken	USDA-NIFA (Multistate)	Mastitis Resistance to enhance Dairy Food Safety	\$34,000
Ynte Schukken, Yrjo Grohn	USDA-AFRI	On-farm Optimal Intervention Programs Resulting in Reduction of MAP Bacterial Load in Milk	\$148,974
Ynte Schukken	Zoetis, Inc	Bovine Dendritic Cell Biology in Late Gestation	\$4,373
Ynte Schukken, Yrjo Grohn	Zoetis, Inc	Longitudinal Phenotypic and Genomic Data Collection for Dairy Cows	\$101,352
Rebecca Smith, Yrjo Grohn, Ynte Schukken	NIH	Mathematical and Statistical Modeling of Mycobacterial Disease Control	\$71,388
Michael Stanhope	Nova Southeastern University	Comparative Conservation Genomics of Sharks - Phase II	\$22,719
Michael Stanhope	Nova Southeastern University	Comparative Conservation Genomics of Sharks-Phase I	\$129,242

Tracy Stokol	NIH	Center on the Microenvironment and Metastasis: Adhesion of Tumor Cells in Vascular Microenvironment	\$72,355
Tracy Stokol	Grayson-Jockey Club	Platelet Inhibitors: Potential Antithrombotics for EHV-1	\$68,368
Bettina Wagner, Gillian Perkins	Harry M. Zweig Memorial Fund for Equine Research	A Novel Strategy to Boost Antibody Production to EHV-1 in Neonates	\$82,945
Bettina Wagner, Gillian Perkins	Harry M. Zweig Memorial Fund for Equine Research	Innate Immune Mechanisms and T-cell Responses to Equine Herpesvirus Type 1 in Latently Infected and Naive Horses	\$88,499
Bettina Wagner	USDA-FFF-Animal Health - CUAES	Preventing Lyme Disease in Horses	\$27,000
Bettina Wagner	University of Pennsylvania	Serum Biomarkers for Equine Laminitis	\$16,013
Lorin Warnick	Washington State University (USDA)	Minimizing Antimicrobial Resistance Transmission: The Dairy Farm as the Model System	\$2,949
Lorin Warnick, Richard Pereira, Rodrigo Bicalho	USDA-Federal Formula Funds	Effect of Feeding Dairy Calves Milk Containing Antimicrobial Residues on the Emergence of Resistant Enteric Bacteria	\$30,000
Francis Welcome	USDA-Smith Lever	400K Beat it!	\$30,000
Francis Welcome	I2 Air Fluid Innovations	Evaluation of the Germicidal Activity of i2 VP Using Excised Cow Teats	\$15,120
Matthias Wieland, Daryl Nydam	Cornell Residents Research Grants Program	Umbilical Cord Care: Effects on Navel Involution, Calf Health and Growth	\$6,888

Total			\$36,962,870
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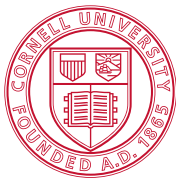
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Make your plans for any of these celebrations!
More details are coming soon.

- NEW YORK CITY** • September 13, 2014
- HOMECOMING ITHACA** • October 17–18, 2014
- WASHINGTON, D.C.** • November 14, 2014
- HONG KONG** • December 15, 2014
- BOSTON** • January 17, 2015
- WEST PALM BEACH** • February 14, 2015
- SAN FRANCISCO** • March 6, 2015
- LOS ANGELES** • March 8, 2015
- LONDON** • May 14, 2015

Our Sesquicentennial-year kickoff weekend in NYC culminated in a festive program at Jazz at Lincoln Center: “The Big Idea: Cornell Celebrates 150.”

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