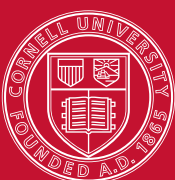


CORNELL Veterinary Medicine

College Report 2005–2006

140 Years and Counting



Cornell University
College of Veterinary Medicine

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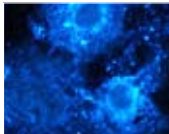


Many Values, One Clear Vision

The College of Veterinary Medicine at Cornell University values its leadership position in academic veterinary medicine. Advancing veterinary medicine at the interface of discovery and application is the college's unifying conceptual framework. Discoveries identified at the molecular, cellular, organismal, and population levels ultimately inform the practice of medicine. In a parallel fashion, the organization and conduct of medicine influence the type and behavior of research. The college values scholarship across the full spectrum from molecule to medical application and demonstrates this commitment through research, educational programs, and professional service. The college will continue to excel in providing education and advanced training that prepare veterinarians and scientists to serve society in critical roles in clinical and diagnostic veterinary medicine, public health, scientific inquiry, and public policy. The college strives to advance animal health through discovery-based research, the delivery of excellent clinical care, and continued vigilance against the spread of disease. The College of Veterinary Medicine at Cornell University endorses the concept of one biology in advancing the understanding of both animal and human health, encourages and fosters open collaboration across disciplines and institutional boundaries, and seeks to integrate discovery and application in order to deliver the greatest possible benefits to society.

—college vision statement, adopted by the faculty in 2003

Veterinary Medicine and the New Life Sciences



Cornell University is internationally recognized for its commitment to life sciences research, education, and outreach. Our New Life Sciences Initiative sets the pace among America's great research institutions for interdisciplinary approaches to the biological basis of living organisms and the use of this information to improve the quality of our lives. The College of Veterinary Medicine plays a critical role in our university-wide effort. The breadth of the college's clinical, scientific, and educational programs—including fundamental studies of life processes, comparative studies of conditions across species, and the subsequent development of innovative prevention protocols and clinical treatments—places the College of Veterinary Medicine at the crossroads of interdisciplinary studies of life. Anticipating its critical role, the college strategically realigned its programs and departments in 1998 to become an even more effective participant in the new life sciences revolution as new opportunities and challenges arise. The capabilities of veterinary faculty and their eagerness to collaborate make these clinical scholars, researchers, and educators highly valued in coordinated academic programs across Cornell's campus in Ithaca and at Weill Cornell Medical College in New York City. Moreover, the increasing number of meaningful collaborations with other institutions across the nation and world ensures that the college will continue to make its mark in animal health, veterinary-related public health, and comparative medicine in the twenty-first century. Because of its collective vision and commitment to its broad mission, the College of Veterinary Medicine will continue to advance and make important scientific breakthroughs as well as serve societal needs.

A handwritten signature in black ink that reads "Carolyn (Biddy) Martin".

Carolyn (Biddy) Martin
Provost, Cornell University
September 2005

The Very Best Medicine

Cornell University Hospital for Animals is among the great veterinary medical centers in the world.

Imagine an animal medical center where, in three different wings, a Triple Crown–entry racing Thoroughbred is treated by laser surgery for a malfunctioning throat palate, a miniature poodle is operated on for valvular heart disease, and a 3,000-pound breeding bull has abdominal surgery to repair an intestinal obstruction. At the same time, an aging Siamese cat is diagnosed with a brain tumor in an MRI machine and receives radiation therapy with an electron-beam linear accelerator, and a 60-year-old Amazon parrot receives her annual vaccinations.

Imagine a hospital where the diagnostic laboratory experts are as facile at identifying a metastatic tumor in the abdomen of a horse as they are at diagnosing septicemia in a snake. Imagine a partnership between farmers and researchers, where entire herds benefit from the expertise of nationally renowned clinicians and the latest data and technology.

This is Cornell—a teaching institution of the highest caliber, where veterinary specialists in 16 fields, ranging from animal behavior to radiation oncology, treat animals that arrive by car, van, and, periodically, charter jet.

Cornell's first comprehensive clinical programs started in 1905, as the College of Veterinary Medicine was beginning to expand from an exclusively equine and livestock practice to include companion animals. Throughout the last century, our emphasis has been on partnering the very best medicine with our core obligation as a teaching institution. We believe that a comprehensive medical center staffed by a broad range of clinical specialists provides the ideal educational infrastructure in which to train the next generation of veterinarians. This is where the textbook and the research laboratory unfold in the minds of budding students, under the careful tutelage of clinical scholars committed to educational enrichment.

We extend clinical knowledge. At Cornell, we don't experiment on patients. But we do learn from the animals for which we provide medical care, and that knowledge is recycled in an ever-tightening spiral of discovery to practice. The natural pairing of the basic scientific and clinical research that takes place at Cornell gives researchers insights into potential therapies, for both animal and human illnesses. Our faculty continuously analyze their experiences, preparing scholarly articles and presentations for their peers around the world and their practitioner-colleagues here at home.



“I knew about Cornell being the best veterinary school, but I am struck by the level of excellence you see at the hospital and also by the level of caring. It is very unusual.”

—Patricia Cornwell, mystery novelist and proud guardian of a menagerie of bulldogs, a Boston terrier, and other assorted animals



Traveling Veterinarians. Nearly 40,000 farm animals every year are examined and treated by the ambulatory and production medicine service of the Cornell University Hospital for Animals. Visiting more than 400 farms within a 30-mile radius of Ithaca, the traveling veterinarians also investigate herd outbreaks so that diagnosis, treatment, and prevention of disease may be practiced. Their work also provides a learning opportunity for farm managers, who must operate in an increasingly competitive economic environment. In a natural environment where new and re-emerging diseases can wipe out a whole herd and a farm family's future, a teaching hospital is key to survival.



First Open MRI for Pets. Magnetic resonance image (MRI) scans are done at the Cornell University Hospital for Animals using North America's first permanent, open-magnet MR system specifically designed for companion animals. The system takes advantage of open imaging technology and specialized software to generate clear, high-resolution images.



Special Arrangements for a Canine in Need. Patricia Cornwell (back) with “Okey,” a rescued bulldog she brought to Cornell for treatment

Services and Specialties

Anesthesiology, Behavioral Medicine, Cardiology, Community Practice Service (Primary Care), Critical and Intensive Care, Dentistry, Dermatology, Emergency Medicine, Internal Medicine, Medical Imaging, Oncology, Ophthalmology, Orthopedics, Surgery, Theriogenology (Reproductive Services), Wildlife and Exotic Animal Medicine



Surgeon Adds Genes to His Repertoire.

Dog owners with pets suffering the painful, crippling disorder called canine hip dysplasia (CHD) consider themselves lucky with Rory Todhunter, associate professor of surgery, on their case. He has restored near-full mobility to dogs that were never expected to walk again. Yet, this orthopedic surgeon would rather cut genes than cartilage. Hoping to practice the ultimate in preventive medicine, Todhunter's research interest is the identification of the genes, or group of genes, responsible for the development of osteoarthritis in dogs—and maybe someday, in people, too.

With the mapping of the canine genome complete, Todhunter and others at Cornell have identified chromosomal regions of interest in affected pedigrees. Next, Tod-

hunter will use a fine-mapping approach with DNA samples from large numbers of unrelated dogs to refine his identification of gene candidates with a role in the expression of the disease. By searching across dog breeds to find the chromosomal regions that confer protection or susceptibility to hip dysplasia and secondary arthritis, he can narrow the regions in which to search for candidate genes.

His work could lead to a genetic screen for CHD and, with that diagnostic tool, dog breeders eventually could eliminate the inherited defect altogether. "Finding the genes that contribute to or protect against hip dysplasia and other common inherited diseases in dogs is the holy grail for canine geneticists," says Todhunter.



Dedicated to Equine Care. The college offers two courses in therapeutic horseshoeing, taught by Michael Wildenstein, the resident farrier of the Cornell University Hospital for Animals. A master farrier, Wildenstein has achieved the highest distinction in the craft—certification as a fellow of the Worshipful Company of Farriers, an English guild founded in 1356. He is the only American ever to have received this distinction. Wildenstein works with veterinary faculty to treat gait and lameness issues with corrective trimming and shoeing. (photo: University Photography)

"I was thrilled to discover that Cornell is educating specialists in shelter and wildlife medicine who will, in turn, train the next generation. Supporting education is the key to improving life for all living beings."

—Janet Swanson, proud companion of several rescued dogs, cats, and parrots



A health examination for a young parrot

All Creatures—Great, Small, and Exotic. While you may not think of guinea pigs or parakeets as exotic animals, they are indeed exotic in veterinary medical parlance. As birds, reptiles, and "pocket pets"—small mammals such as ferrets, rabbits, and rodents—become more popular, so does demand for medical services for these diverse creatures. James Morrissey, a diplomate in avian medicine and specialist in exotic species, became a member of the Cornell veterinary clinical faculty three years ago. He joined a team—led by George Kollias, the Jay Hyman Professor of Wildlife Medicine, and Noha Abou-Madi, lecturer in exotic and wildlife medicine—that specializes in exotic, wildlife, and zoo animal medical care.

"Cornell's hospital sees 700 to 800 pet birds each year," Morrissey says. "We conduct purchase exams for new owners, vaccinate, provide breeding and clutch evaluations, and treat infectious and chronic diseases." The veterinarians also treat wild birds—raptors, waterfowl, and songbirds—brought to the hospital by concerned citizens and conservation officials. One of Morrissey's roles is to coordinate care for his special charges by engaging expertise across the medical specialties to make a diagnosis and plan for treatment of such diverse animals. "We use all the technology and expertise available at Cornell—we've done cancer therapy on rabbits and penguins, used imaging techniques to diagnose problems in parrots, and put prosthetics in owl's eyes," he says.

Neonatal Intensive Care.

Cornell has one of the most complete intensive-care and neonatal facilities for large animals in the country. Great facilities coupled with the expertise of our clinical faculty—such as Jillian Perkins, chief of large-animal medicine at the Cornell University Hospital for Animals—ensure the best care for the very difficult cases. In addition to her clinical responsibilities, Perkins teaches an elective course on large-animal neonatology and provides special training to the Foal Team, a cadre of veterinary students who work in the neonatal intensive-care unit assisting faculty and nursing staff in providing

24-hour care. Not surprising, Perkins's research focuses on foal-health issues. Currently she is gathering pilot data that may help develop diagnostic tests and treatments for hypoxic ischemic encephalic foals (using the hospital's magnetic resonance imaging unit) and septic foals. She also is involved in a project with Cornell colleague Dorothy Ainsworth, professor of medicine, and faculty from Tufts University and the University of Guelph—they are investigating causes of inflammatory airway diseases in young horses.



Learning, the Cornell Way

A comprehensive veterinary college and major animal medical center—all within a premier research university—are tremendous resources for Cornell students.

Because of Cornell's concentration of intellect, interdisciplinary scientific cooperation, and clinical resources, the learning experiences possible at the university are unique and difficult to duplicate. The veterinary academic program, leading to a doctor of veterinary medicine (DVM) degree, is continually evolving to prepare veterinarians to pursue diverse career paths. It provides a broad-based education in all of the traditional subjects and, in an era of increasing specialization, gives students the opportunity to develop greater expertise in an area of their choice. In addition to a strong foundation in biomedical and clinical disciplines, the educational program emphasizes communication skills, client relations, ethics, public health, practice management, and professional development.

The veterinary curriculum's innovative design and flexible structure allow Cornell students to develop skills needed for modern veterinary practice. The teaching formats—especially the incorporation of small-group learning and collaborative work—foster proficiency in individual learning skills and problem solving. Preclinical courses use clinical cases to engage students and promote curiosity while teaching the scientific principles that underlie medicine. Work with faculty and peers, as well as independent work, helps students assume greater responsibility for their education, teaches them to use additional resources, and fosters habits of lifelong learning.

Cornell invests in the best resources for veterinary education—modern and well-equipped classroom, computer, and clinical facilities and a faculty who are dedicated teachers and leaders in their respective fields. A variety of educational resources, readily accessible to students at all hours, are available to support learning. Faculty members have created a broad collection of computer animations, simulations, tutorials, and digital videos to help students understand concepts and processes that are difficult to convey through traditional media. A vast collection of electronic and print resources are available in the college's library, which also provides access to several thousand electronic journals. The Cornell University Hospital for Animals is equipped with state-of-the-art equipment that allows for the most advanced diagnostic and therapeutic procedures. Under the direction of the clinical faculty, students play an integral role in the health care of animals and in communications with hospital clients. The hospital and the Animal Health Diagnostic Center provide clinical and diagnostic environments that stimulate students to explore unfamiliar areas of the profession and nurture their curiosity, under the mentorship of inspirational veterinary educators.



Making the Most of a DVM Education. The goal of Anton Asare, Class of 2006, is to pursue a career in international veterinary medicine and veterinary public health—and he is busy preparing himself. During the summer after his first year of veterinary college, Asare traveled to Ghana to learn about issues facing production-animal veterinarians. He returned to Cornell with a greater understanding of the complex links between government, the economy, local infrastructure, and demand for veterinary services. In January of his second year, Asare traveled to India as part of a course in international agriculture in developing nations. The following summer, he participated in Cornell's Leadership Program for Veterinary Students, where he worked in the Quality Milk Production Services food-science lab. Last year, Asare's desire to understand the reasons few minorities enter the veterinary profession led him to obtain a grant from the Geraldine Dodge Foundation. He conducted research focused on teenagers' attitudes and knowledge of veterinary medicine as a career. He found there was a lack of knowledge about animal health careers, a perception that such careers were not desirable, and a lack of mentoring for youth who had an interest in working with animals. He presented the results of his study at a national meeting of veterinary educators and is preparing a manuscript for publication in the *Journal of Veterinary Medical Education*. As he begins his fourth year, Asare is assured many opportunities from which to choose—private practice, work with the U.S. Department of Agriculture or other veterinary public health agencies—as he plans his career path.

“One of the best days of my life was when I was informed of my admission to Cornell. It was right before the holidays and really made the season one to celebrate.”

—Matt Baron, Cornell DVM Class of 2006



Choosing to Focus on Small-Animal Medicine.

“One of the best days of my life was when I received an e-mail informing me of my admission to Cornell,” says Matt Baron, Cornell DVM Class of 2006. As a boy he raised ducks and chickens, and his family had a dog, too. But Baron traces his interest in veterinary medicine to his grandparents’ dairy farm. “I was always curious when the veterinarian visited to care for the animals,” he says. “I enjoyed learning about farm management, herd health, breeding decisions, and pedigrees.” You would think his early experiences would have led Baron to become a large-animal specialist, but he has chosen to focus on small-animal medicine, explaining that he enjoys interacting with families and

their animals. In high school and college he worked and volunteered in large- and small-animal practices as well as in research. “That variety of experiences helped me decide to concentrate on small animals,” he says. “The great clinical experiences at Cornell solidified my decision.” Baron is especially appreciative of the veterinary faculty, explaining, “On every clinical rotation I am enthralled by the new topic and each professor’s passion for teaching the subject.” The case-based curriculum supports the class as a whole group, he adds—students work through tutorials and learn together.

So You Want To Be a Horse Doctor. It’s called the Equine Immunology Research and Training Program, and most participants have advanced degrees behind their names. But for some enterprising veterinary students at Cornell the program is one stop on their career paths to become practicing veterinarians. Take Danielle Brinker, for example. As a second-year DVM student she began working with Bettina Wagner, a senior research associate in the equine immunology program. Brinker is trying to compare equine IgGs (the immunoglobulin antibodies that are passed from mother to fetus during pregnancy) with IgGs of closely related species. The basic-science experiments put her at the forefront of immunology research and equine reproduction—not such a bad place for a student, Brinker says. “Participating in research has significantly contributed to my education,” says Brinker, whose post-graduate plans include an equine-medicine internship to prepare for work as an equine practitioner. “I am getting a better understanding of the theoretical basis for treatments, and now I’m more willing to ask why certain things occur the way they do.”



Benefiting Animals, Serving Society

Although our graduates have an unprecedented range of career opportunities, advancing the health of animals and serving the needs of the people who care for them is still their common purpose.

The majority of Cornell veterinary graduates choose private, small-animal practice, providing care for pets and advice to families in New York State and across the nation. Other graduates find that the unique skills of veterinarians—the ability to diagnose and treat a wide array of diseases in many species, to assess environmental health risks for people and animals, and to understand comparative medicine across a broad range of species—are in demand in areas such as public health, national security, industry, and biomedical research. However, even four years of Cornell's innovative, case-based curriculum cannot totally prepare our DVMs for every career possibility—that is the role of an additional layer of training that includes internships and residencies, graduate-degree programs, and continuing education.

The college offers a wide range of programs to entice students into research careers in veterinary medicine. Summer research experiences are encouraged for undergraduate students (in the New Horizon's program), current veterinary students (in the Leadership and Veterinary Investigator programs), and graduate students. Those students who commit to PhD degrees, either before, during, or after receiving their DVM degrees, take advantage of a comprehensive graduate program that utilizes the strengths of the veterinary faculty in addition to a variety of faculty on the Ithaca and New York City campuses.

Cornell is committed to developing educational programs to meet emerging societal needs. For example, to address a critical shortage of veterinarians in the food-animal industry, the Summer Dairy Institute offers specialized training on the Ithaca campus and at dairy farms in the northeastern United States and Ontario, Canada. Likewise, the shortage of research-animal veterinarians has prompted the development of a postdoctoral program at Cornell, the first of its kind to provide training with large animals used in research and education, as well as with the smaller laboratory animals.

Teaching Best Practices in Production Medicine. Dairy farms are the largest cash generator of tangible goods in New York State (\$1.6 billion annually). To give veterinary students the skills they need to excel in an increasingly complex industry, faculty at Cornell developed the Summer Dairy Institute. The specialized program provides ambitious fourth-year veterinary students and recent graduates with an education beyond the scope of the curricula in any North American veterinary school. Academics, practitioners, and professionals from all segments of the dairy industry are brought together to share the latest research, technology, and best practices. The eight-week intensive combines behind-the-scenes tours with hands-on wet labs and intensive

classroom instruction, focusing on production medicine techniques, advanced quantitative skills, diagnostic testing, and clinical practice. Students learn how to gather and analyze data and how to apply the results to decision making in all production practices, including reproductive, milk quality, and nutrition programs.



Who's Feeding the Dogs? As graduation time approached, Kurt Venator figured he could use his doctor of veterinary medicine degree to minister to pets—one cat, dog, and gerbil at a time—by joining a private practice. Or he could improve the health of millions of animals by joining the pet-food industry. “It was tempting to follow the James Herriot model,” Venator says of the country veterinarian whose best-selling *All Creatures Great and Small* books describe the human-animal bond from the veterinarian's end of the stethoscope. When he enrolled, Venator already had one advanced degree—a PhD in neuroethology (the relationship between nervous system function and behavior). At Cornell, he thrived on the college's case-based curriculum, which, he says, makes students better problem solvers and clinicians. “This is a dynamic, growth time in the pet-food business,” Venator says. “There's so much more we can do to meet animals' nutritional and medical needs.” Based on this belief, at 31, he packed up his family and his dogs and moved to St. Louis, where a marketing job in one of the world's largest pet-food companies was waiting. His assignment: help steer research strategies and product development while tracking improved foods from the laboratory to the dinner bowls of cats and dogs.



“I started out wanting to become a dairy practitioner. I never thought one day I’d conduct metabolic studies on rats in space or perform isotope studies on astronauts in flight.”

—Martin Fettman, Cornell DVM 1980, PhD, veterinary payload specialist, *Columbia* space shuttle

Species Preservation: On the Road. Ever since childhood, Catherine Czaya says, she has been fascinated by the amazing diversity among animals. “During my second year of college, an adviser suggested I consider veterinary medicine because of the many career opportunities available to veterinarians.” The first two years in the DVM program at Cornell came close to fulfilling her expectations, but Czaya wanted a shot at hands-on research in a field that piqued her interest: the preservation of endangered species. She got that chance in Cornell’s Leadership Program for Veterinary Students, which matches veterinary students from around the world with research-faculty mentors on the Ithaca campus. Instead of an exotic location filled with wild animals—the stuff of her imaginings—Czaya

found herself working with Gary Whittaker, PhD, associate professor of microbiology and immunology, whose laboratory studies the molecular basis of virus entry into cells. Infectious bronchitis virus (IBV) was the lab’s focus of study that summer. “My task was to characterize infection with two strains of IBV to different cell-culture lines in naturally infected avian epithelial cells,” Czaya says. Her avian animal model wasn’t exactly an endangered species—in fact, it was the common chicken. But then the news spread of avian flu outbreaks in Asia, among chickens and people, too. Suddenly, the applications of microbiology laboratory work to species preservation became much more relevant.



Pursuing a DVM/PhD Calls for Moxie.

That is certainly true of Karla Stucker, one of the first students admitted to Cornell’s DVM/PhD program. “During my first year, the college’s Graduate Program in Biological and Biomedical Sciences allowed me to rotate through several laboratories, studying viruses and cancer to assess these fields of study,” she says. From that experience she was able to decide that working with Colin Parrish in the Department of Microbiology and Immunology was the best fit for her interests. She now has completed her coursework and the admission-to-candidacy exam for her PhD and has begun her thesis research on canine parvovirus (CPV) in Parrish’s laboratory. She is trying to replicate the probable mutation path that CPV has undergone during adaptation to its canine hosts. She also will be studying the interac-

tions between CPV and its host cells to determine which cellular factors the virus requires for infection and replication and how these requirements have changed as CPV has evolved. With her PhD coursework under her belt and her thesis work begun, Stucker started the DVM curriculum in fall 2004 and hopes to complete the four-year program in consecutive years. In her spare time she volunteers as both a class instructor and a puppy raiser for Guiding Eyes for the Blind—she has trained two puppies already—and is active in pick-up soccer games with other veterinary and graduate students. She also manages to find time for some fun—she spent her summer vacation in Africa climbing Mt. Kilimanjaro.

One Biology, One Medicine

Each time an organism's genome is sequenced, we are reminded how much all living things share.

New understanding of one genome is leverage to learn about another, and another. This quest for knowledge has impelled Cornell University to invest \$600 million in the New Life Sciences Initiative. The university is investing more than \$90 million to refurbish its animal-care facilities and build new ones, including the East Campus Research Facility on the veterinary campus; \$14 million for a pathology and waste-management teaching complex renovation; and \$140 million for the 250,000-square-foot Life Sciences Technology Building. Human capital is even a bigger part of Cornell's investment in the future of life sciences. The opportunity to base their laboratories without the traditional disciplinary boundaries—and to partner with others who share their interests—is a powerful recruiting inducement for leading researchers. Graduate students and postdoctoral fellows, as well as enterprising students pursuing joint degrees (DVM/PhD, for example), find a place and support for their work in Cornell's New Life Sciences.

A research-oriented veterinary college that is embedded in a university focused on life sciences is an ideal place to seek solutions for medical conditions that affect multiple species. For a basic understanding of how diseases work, collaborative researchers at Cornell rely on specialists in fields such as computational biology, bioengineering, molecular biology and genetics, chemistry and chemical biology, and microbiology and immunology. So while the work may be based in the veterinary college, the knowledge contributes to the understanding of diseases in humans as well as in animals.

Cornell's quest for transferable knowledge doesn't end with collaborations on the Ithaca campus or the Weill Cornell Medical College in New York City. Biomedical scientists in the Tri-Institutional Research Collaboration (Rockefeller University, Memorial Sloan-Kettering Cancer Center, and Cornell University) work hand in hand—and with collaborators around the world.

Discovery in Yeast May Provide Key for Stopping Fatal Disease. Ruth Collins, Cornell assistant professor of molecular medicine, and her research team made a discovery in yeast that has important implications for finding a cure for a devastating disease of nerve cell degeneration called familial dysautonomia (FD), also known as Riley-Day syndrome.

The researchers have found a gene that is a major player in determining the structural and functional asymmetry of cells, or cell polarity. The gene, *Elpi*, is critical in regulating cell polarity, such as directing growth to the tip of a cell so that a “daughter” cell can “bud” off to divide.

“This discovery is exciting because it gives us new understanding of the basic mechanisms of cell growth and differentiation and also provides critical insight into the pathogenesis of FD, which may arise in large part from a lack of fully developed neurons,” says Collins, whose research team includes Pete Rahl and Catherine Z. Chen, both Cornell graduate students.

FD, which is manifested soon after birth and usually results in a lifespan of less than 30 years, is caused by a genetic defect in a protein that is the human counterpart of the *Elpi* gene in yeast. The disease is particularly prevalent in the Ashkenazi Jewish community, where an estimated 1 out of 27 people are carriers of the mutant gene.



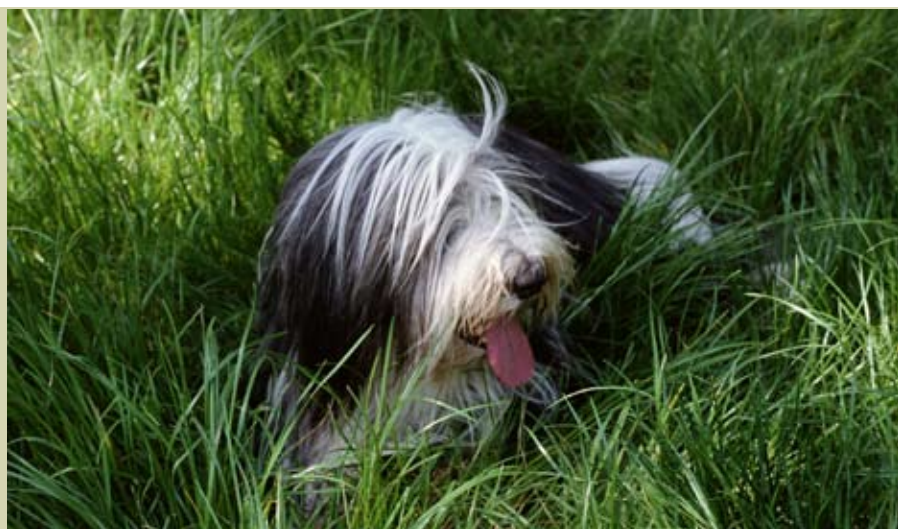
Neurons direct new growth to a tip of the cell. Collins suspects that the neurological deficits in FD patients may be due to the defective protein's interfering with directional growth, thus preventing the neurons from developing correctly. *Elpi* also may be neces-

sary for the maintenance and stability of neurons, she says.

The researchers plan to generate animal models to extend their insights and begin to test therapeutic interventions.

“Now that veterinary medicine has been established on a scientific basis, human and veterinary medicine can be brought into a more intimate relationship.”

—James Law, college founder and first dean, 1878



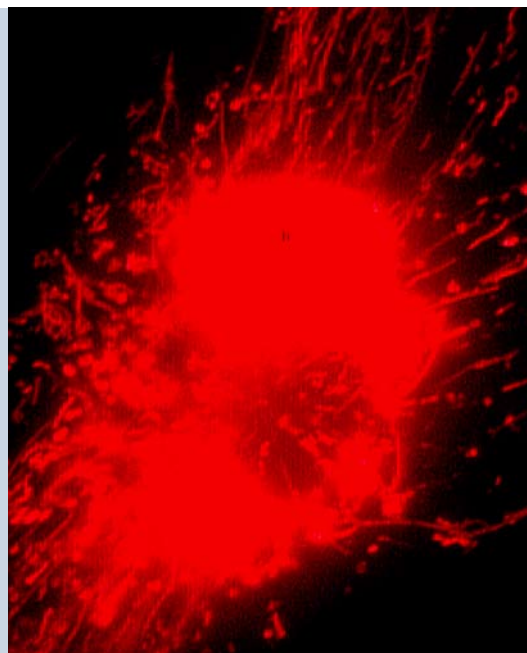
Looking for Cancer Causes at Ground Level.

One possible link between cancer and the environment is exposure to pesticides. The Companion Animal Tumor Registry intends to document this link. This program—part of the college’s Sprecher Institute for Comparative Cancer Research—asks veterinarians to voluntarily report cancers diagnosed in clients’ pets by the ZIP codes of the pets’ residences. “Pets share the human environment, and that includes our mutual exposure to potentially carcinogenic compounds,” says Rodney Page, director of the institute and a professor of oncology. Compan-

ion animals’ exposure may be even more intimate because they are in close contact, for example, with chemicals applied to lawns and carpets, or they are drinking contaminated water. Unfortunately, some 50 percent of family pets over the age of 10 develop cancer. According to Page, advanced treatments are becoming available, so many of these pets can be cured. “Knowledge of where these animals lived when they developed cancer can improve our understanding of the causes of cancer in all species and help to prevent their occurrences,” he says. (photo: PhotoAlto)

Stopping Cancer. Even better than a cure would be prevention. Richard Cerione, professor of molecular medicine, leads a team discovering the structure of cellular switches—protein complexes that allow malignant transformation of cells. Their work could lead to development of tumor-blocking drugs. They are studying Cdc42, a molecular switch that turns on essential pathways in normal and cancerous cells, and GDI (guanine nucleotide-dissociation inhibitor), a key regulator for Cdc42.

Knowing the atom-by-atom structure and shape of this molecular switch and the structure of other cellular proteins that regulate its activity should allow the researchers to identify and even design small molecules that alter Cdc42’s function and thereby prevent induction of the malignant state. The ribbon diagram (right) shows the Cdc42/GDI complex the researchers determined through X-ray crystallography studies in the macromolecular diffraction facility at the Cornell High-Energy Synchrotron Source. (photo: courtesy Richard Cerione)



It Only Takes One. Tuberculosis is a deadly disease, second only to HIV as a worldwide cause for death from infection. According to the Centers for Disease Control, TB kills more than 2.5 million people worldwide and causes nine million new infections each year. The cure for the disease is costly and lengthy, and drug-resistant strains are nearly impossible to treat. Cornell molecular microbiologist David Russell, chair of the Department of Microbiology and Immunology, studies tissue samples from South Africa and other endemic areas to ascertain the mechanisms that lead to the transmission of this killer pathogen. He is analyzing the process by which the dormant phase of the pathogen becomes reactivated and is able to infect others via airborne transmission. “It only takes one inhaled bacterium to result in infection,” he says. In most cases a healthy immune system is able to contain the bacterium, and it sits quietly in the lungs in a noninfectious state. In a weakened immune system, the bacteria flourish and eventually drive destruction of the surrounding tissue. “If we can understand the process that moves the pathogen from the noninfectious to the infectious stage, we might be able to intercede and contain the spread of the disease,” Russell says. (photo: courtesy David Russell)

Translational Medicine

Two-way communication and partnerships between the basic and the clinical sciences amplify what is possible in medical discovery.

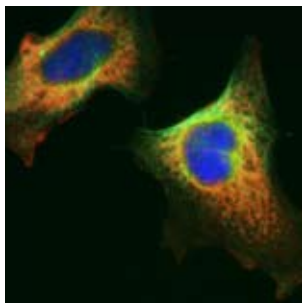
Asked to translate “translational medicine” into plain English, advocates of the new paradigm of improved communication between the basic and the clinical sciences will reply “bench to bedside,” meaning that knowledge moves from the laboratory to application for the patient in the hospital. Within the College of Veterinary Medicine, we think of it as a partnership or feedback loop: scientists and clinicians working on a medical problem inform each other of the issues and insights each gleans from the other’s work. At Cornell the exchange in scientific and therapeutic ideas really gets interesting because we can combine the expertise found in the veterinary college’s biomedical research center with that of the many clinicians, scientists, and medical researchers throughout a university that embraces the one biology—one medicine approach to the new life sciences.

Meaningful breakthroughs in medicine will stem from biological research done at the cellular, molecular, and even submolecular levels, where

a considerable common basis can be found among mammalian species. The basic scientist who has direct access to clinical expertise and perspective is better able to understand clinical realities and to develop a stronger sense of the potential applications of research findings to patient care. On Cornell’s Ithaca campus, basic scientists and biomedical researchers have the opportunity to collaborate with veterinary clinicians. In addition to the tremendous value of their knowledge about animals, veterinarians are trained to take a comparative view of medicine, to notice patterns and similarities between cases that occur in different species. Clinicians who have contact with biomedical research scientists have the opportunity to contribute insights and observations and to alert the researchers to clinical cases that relate to their studies. They also have access to the latest information regarding the causes and potential cures for disease and can put those results into clinical practice sooner and more effectively.

The Power of Translational Medicine

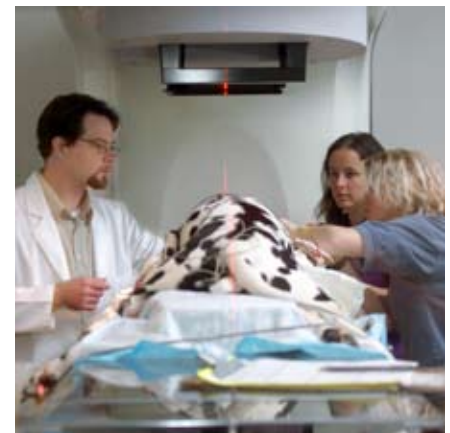
Vital connections along the discovery pathway



Basic Science. From molecular genetics to chemical biology to bacterial genomics, science is the foundation of our understanding about all forms of life. Molecular and cell biology have made stunning advances in the past two decades. This fluorescent image shows IQGAP1 proteins helping to organize microtubule in HeLa cells (cervical cancer cells), providing a potential target for cancer treatment. (photo: courtesy Mahasin Osman)



Comparative Medicine. Targeted gene therapy, bacterial pathogenesis, comparative oncology—progress in science and medicine relies on a diversity of biologies. Comparative by nature, biomedical perspectives open the possibilities and increase the implications of all biologic discoveries. Mice are significant participants in biomedical research being conducted by mammalian geneticists on health topics such as cancer and neurological diseases.

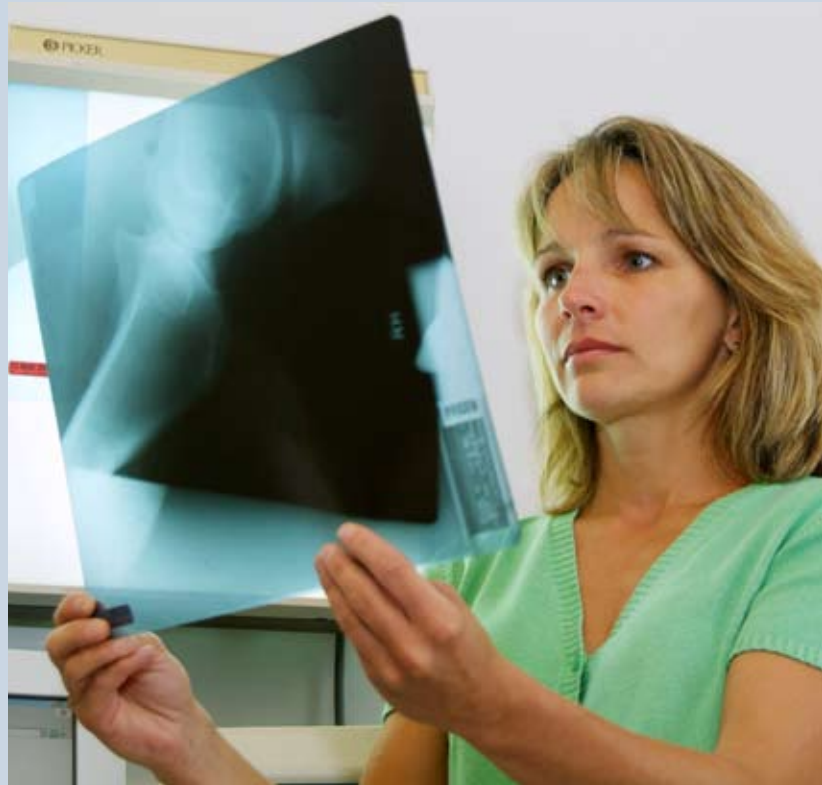


Veterinary Application. Designer vaccines, joint resurfacing, novel chemotherapeutics—astute clinical practice derives the new knowledge on which modern, progressive veterinary medicine is based. Veterinary clinical practice at Cornell informs the basic and biomedical research, which, in turn, produce scientific innovations that drive advancements in animal health and medicine. Above: a canine patient receives advanced radiation therapy for thoracic cancer via the digital linear accelerator at the Cornell University Hospital for Animals.

“A major biomedical research commitment is necessary for the success of veterinary colleges in today’s world.”

—Stephen Ettinger, Cornell DVM 1964, co-author of *Textbook of Veterinary Internal Medicine*

Molecular Mechanisms of Aging and Arthritis. Injured cartilage has a limited capacity for repair, and the end result is frequently arthritis. In both the human and equine athlete, arthritis leads to joint pain, lameness, and loss of performance. Lisa Fortier, assistant professor of large-animal surgery, is an orthopedic surgeon and researcher studying the underlying cellular and molecular mechanisms involved in the development of arthritis, tendon repair, and new therapies for the prevention or management of arthritis. Her studies compare embryonic stem cells to normal and arthritic cartilage cells to identify cellular mechanisms that differ between normal developing cartilage and deteriorated, arthritic cartilage. These studies will lead to a better understanding of why cartilage cannot heal itself and may suggest novel therapeutic targets for treatment or prevention of arthritis. Fortier’s laboratory team also is involved in evaluating the use of platelets to facilitate healing of tendons. The use of platelet-rich plasma (PRP) has been investigated for augmented tissue repair in human maxillofacial surgery. Fortier believes that PRP may provide a potentially effective method of augmenting tendon and bone healing. Current efforts in Fortier’s laboratory and clinical practice include using PRP in the treatment of tendon injury in horses to determine its effects compared to those of bone marrow on the metabolism of equine tendons and ligaments.



Research technicians prepare a dog for Holter monitoring

Heartbeats and Inheritance. In 1987, N. Sydney Moïse, professor of medicine (cardiology) and section chief, cardiology, met a dog breeder with an unusual and distressing problem—one that would become the focus of her medical research. The breeder learned from four distraught owners that their German shepherd puppies (from an original litter of nine) had died suddenly when they were approximately 16 weeks old—three while sleeping and the fourth while resting after play. Postmortem examinations revealed no cause of death. The clinical signs led Moïse to an intensive investigation in which she determined that the puppies suffered from a complicated inherited cardiac disease. She has continued to study the disease for the past 15 years, with the goal of developing preventive measures. Through her research Moïse has found that German shepherd dogs afflicted with this disease of sudden infant death have both ventricular arrhythmias and ventricular tachycardia

(rapid heart rate). Dogs with a severe form of the disease have a 50 percent chance of sudden death. Ventricular tachycardia occurs most frequently during slow-wave sleep and rapid-eye-movement sleep, and between 4 and 7 a.m. in the morning. No drug has been identified that can consistently decrease the risk, and there is no cure. If a dog is at extreme risk, Moïse says, the implantation of a cardioverter defibrillator may provide successful treatment. And if an affected dog lives past two years of age, the risk of death is low. Teresa Gunn, an assistant professor of genetics who studies various disorders in mice, is working with Moïse to identify the genetic basis of this devastating condition in German shepherd dogs. In addition to answering scientific questions, the two researchers also are training a new generation of translational biologists whose expertise will encompass both clinical and basic science.

Everyone's Doctor

Veterinarians play important roles in many areas of animal and public health—even global health.

In addition to studying multiple species, Cornell's DVM students learn about the role of modern veterinary medicine in human and community health. These veterinary students are about to become more than large-animal doctors or companion-animal doctors or a zoo-animal doctors—the shingle they hang should read "Everyone's Doctor."

The College of Veterinary Medicine is an interconnected microcosm of the world that the students are about to enter. In the Animal Health Diagnostic Center at Cornell, researchers are developing new tests for infectious diseases carried by animals and devising better strategies for tracking disease outbreaks. Each day samples are tested for a large number of disease conditions in livestock, poultry, horses, and companion and zoo animals. Some of the testing is done as part of a federal- or state-funded surveillance

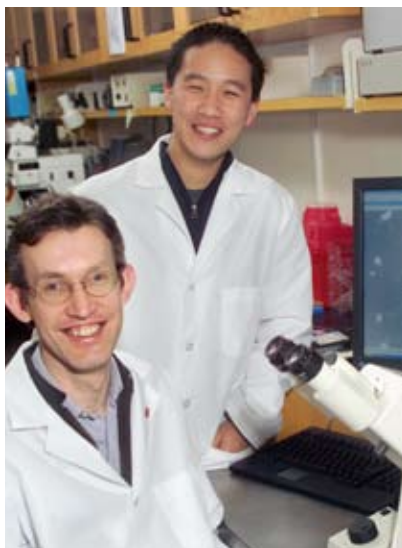
program, like the testing for bovine spongiform encephalopathy ("mad cow disease"), chronic wasting disease (recently diagnosed by this laboratory in the state of New York), avian influenza ("bird flu"), and activity of West Nile virus in domestic and zoo species.

Cornell veterinarians have a role in protecting public health from the potentially fatal rabies virus, too. Their pioneering program to orally vaccinate raccoons in the Northeast has become a model for raccoon rabies control in other parts of the eastern United States.

The importance of veterinarians is also seen in Cornell's popular consumer newsletters *DogWatch* and *CatWatch* and in the Feline Health Center's call-in service for consultation and diagnostic information.

Avian Influenza: A Worldwide Health Threat. Influenza viruses are among the most complex pathogens on earth. The various forms of the virus are able to infect a multitude of animal species, including humans. The virus tends to mutate naturally over time, and this progression of change may allow it to infect new species or foil attempts to contain infection via vaccination.

Avian flu can be found in chickens, waterfowl, and migratory birds. Until recently, previous outbreaks of highly pathogenic forms of avian flu in the United States, Europe, and Asia led to the slaughter of millions of birds, resulting in severe economic and trade impacts, but not human disease. The situation is different now, and while human infection with avian viruses is still rare, it has had a very high mortality rate (50 percent) in a number of Asian countries since 2004. The potential for a human pandemic is a cause of concern for the World Health Organization, the Food and Agriculture Organization, and the World Organization for Animal Health.



Cornell veterinary researchers are working on a variety of fronts to understand and contain this health threat. For example, in 2005 Gary Whittaker, associate professor of virology, announced a major discovery in the influenza infection pathway—a necessary second receptor site needed for cell infection by the virus. This discovery opens up a new prevention strategy, as drugs could be developed to block that entry point of the flu virus into the cell.

Ed Dubovi, director of the virology diagnostic laboratory, is looking for influenza virus transmission across species barriers. His work led

to the discovery in 2004 that greyhounds in Florida were infected with an equine flu-virus strain. Karel Schat, professor of avian virology and immunology, is involved in an international effort to conduct research on the increasingly deadly pathogenic strains of avian influenza viruses being found around the world. This work will take him to a high-security animal research laboratory in Australia and to other places near the epicenters of outbreaks of new strains of avian flu. Ben Lucio, a senior extension associate, works with poultry farmers—in both commercial and backyard operations—to monitor for disease and safe management practices. Sue Trock, a senior extension associate working with the New York State Department of Agriculture and Markets, is coordinating the monitoring of the live-bird markets in New York City for the circulation of low-pathogenic forms of avian influenza that could have the potential to mutate to highly pathogenic forms of the same virus. Cornell's Duck Research Laboratory on Long Island monitors the activity of avian influenza and other pathogens on domestic duck farming.



“If we are doing our jobs right as public health stewards, we implement programs and save people’s lives before they know them to be in jeopardy.”

—Douglas Aspros, Cornell DVM 1975, hospital director, Bond Animal Hospital, White Plains, New York



Helping Families and Their Pets.

Janet Scarlett, associate professor of epidemiology, and Katherine Houpt, professor of behavioral physiology, work from opposite sides of a continuum to help pets and families connect and stay together. Scarlett’s research focuses on the population of animals in shelters. She collects data looking at shelter practices and from the data recommends best-management practices. “Shelters are forced to kill millions of healthy, potentially adoptable dogs and cats each year in this country,” says Scarlett. “No other disease or condition of young companion animals takes as many lives as euthanasia.” Her research has yielded information that shelters can use to improve their animal environments and enhance public education and socialization programs to increase the success rate for adoptions.

While Scarlett is helping populations of animals in shelters, Katherine Houpt is working one animal at a time to keep them in their current homes. “Behavior problems are one of the major reasons for surrender,” says Houpt, a diplomate of the American College of Veterinary Behaviorists. “People often need help to understand how best to work with an animal and

keep it in their family.” Through consultations with owners of various species, from cats and dogs to horses, she observes the behavior of both animal and owner and coaches owners on ways to train the animal or change the environment to correct the problem.

Cornell’s veterinary students take classes in both shelter medicine and behavior. The shelter medicine class covers everything from animal control management, shelter diseases, and early-age neutering to the link between animal abuse and human violence. Cornell has a residency program in behavior medicine, and, thanks to recent gift from Maddie’s Fund, Cornell now will expand its shelter medicine program.



Unique Preparation to Make a Difference.

During her undergraduate training Ellen Carlin is developing an interest in the preservation of endangered species, the pressures of human development encroaching on wildlife habitat, and public policies concerning animal and human welfare. “I am interested in helping the broad population, intervening in the preservation of species, and improving community health,” she says.

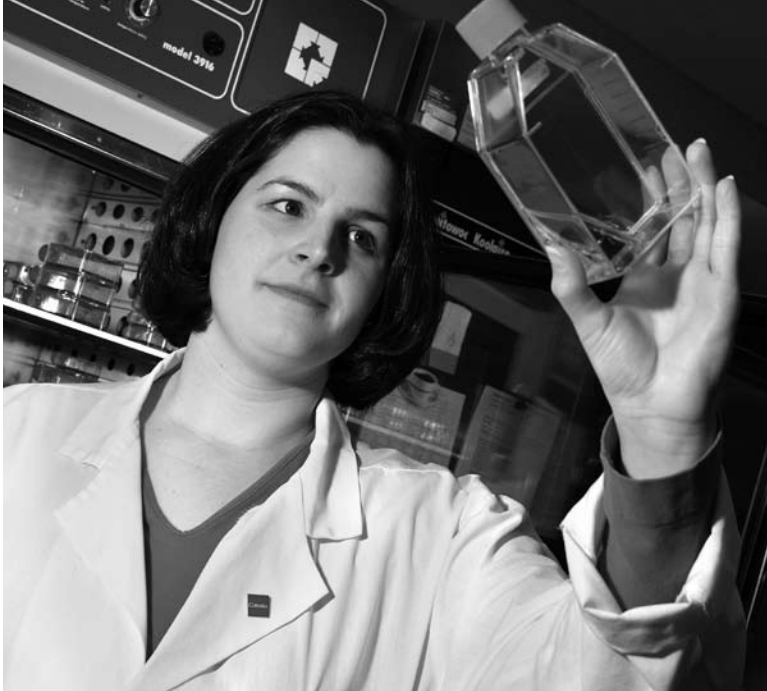
This summer Carlin interned at the National Institutes of Health laboratory in Montana researching “relapsing fever,” a disease with flu-like symptoms that is spread by soft ticks in the western United States. Once identified, the disease is easily controlled by antibiotics, and it does not represent a major human health concern. However, a similar spirochete is responsible for widespread human infection in some African countries, where so much of the population has a compromised immune system from HIV infection and where antibiotics are scarce.

Carlin also participated this summer in the Smith-Kilborne Foreign Animal Disease Training Course, which is offered annually to one student from each of the 28 veterinary colleges in the United States. The course, taught at Cornell University, includes a segment at the U. S. Department of Agriculture’s Plum Island Animal Disease Center. “Veterinary medicine is such a natural preparation for public health careers, especially in this day of increased activity of zoonotic diseases, human and animal population growth, and environmental concerns.” Carlin says.

Animal Health and a Healthy Economy

Be they sources of food and fiber, recreation, or companionship, animals—and their health and well-being—are a major part of a healthy economy.

When it comes to animal production economics, the estimate is that dairy and animal production provided \$1.9 billion to New York State farmers in 2002. That accounts for 60 percent of all cash receipts.



The economic impact of a disease event in animals—production animals as well as companion animals and wildlife—is difficult to quantify and is particularly great at the national level. Animal health and public health are very much interrelated. In today's society, a large population of companion animals have an extremely close relationship with their owners. In addition, there are increasing opportunities for interaction between people and wildlife species. Such interactions increase the possibility of transmission of diseases from animals to humans, and vice versa, and at the same time increase the possibility of emerging disease situations, particularly when diseases jump across species.

The role of veterinary medicine is crucial to a healthy state and national economy. In a global marketplace where a host of emerging diseases and recurrences of forgotten diseases threaten the viability and salability of food animals and animal products, Cornell's Animal Health Diagnostic Center (AHDC), in conjunction with the New York State Department of Agriculture and Markets, is prepared for the unexpected. The New York State Cattle Health Assurance Program, for example, provides teams of advisers to develop farm-specific herd health plans and implement integrated disease-prevention programs. Their goal is to increase herd health, productivity, and profitability while assuring food safety, public health, and consumer confidence. The same goals, when applied to fish instead of

It Pays to Be Prepared. When chronic wasting disease (CWD) of deer and elk appeared for the first time east of the Mississippi river in 2002, the U.S. Department of Agriculture issued a bid for the creation of laboratory capacity in the states to diagnose this emerging disease. Cornell's Animal Health Diagnostic Center (AHDC), in cooperation with New York State's Department of Environmental Conservation and Department of Agriculture and Markets, responded to the call and was awarded a contract to provide testing for northeastern states for CWD and for scrapie of sheep and goats. A year later, the United States detected its first case of bovine spongiform encephalopathy (BSE, or "mad cow disease"), and the USDA once again called on the states for help. In June 2004 Cornell's AHDC became one of only seven high-throughput testing laboratories for the enhanced surveillance of BSE. In its first year of testing, more than 60,000 brain samples have been examined at Cornell.

In spring 2005 the inevitable happened: CWD infection was suspected in farmed deer herds in counties to the east of Cornell. It fell to Bradley L. Njaa, assistant professor of biomedical sciences, to deliver the verdict. Some domestic deer samples did, in fact, test positive. Currently, Njaa and other professionals at the AHDC are planning with the state Department of Environmental Conservation to provide all the testing necessary during the upcoming deer-hunting season. This enhanced testing will provide needed information about the full extent of CWD infection in New York State.

"This is exactly the kind of work we should be doing as part of our mission as the state's animal health diagnostic laboratory," says Alfonso Torres, executive director of the ADHC. "We were able to detect the first incursion of CWD in our state with a high level of expertise and in a timely fashion because we were prepared for this eventuality."



“Veterinary science assures the health of animals, contributes to the safety of foods of animal origin, improves public health, promotes environmental stewardship, and fosters economic growth.”

—Alfonso Torres, DVM, PhD, executive director, Animal Health Diagnostic Center

cattle, keep scientists in the Aquatic Animal Health Program of the Department of Microbiology and Immunology focused on diseases of farmed and wild fish.

At the national level, the AHDC has been selected as a full member of the National Animal Health Laboratory Network (NAHLN). This network of 43 state veterinary diagnostic laboratories (in 35 states) provides expanded surveillance and diagnostic capabilities for the early detection of serious animal diseases caused by either natural or intentional (bioterrorism) sources. Of all the NAHLN laboratories, the AHDC is one of just seven laboratories providing a full range of services in testing for diseases like foot-and-mouth disease, classical swine fever, avian influenza, Newcastle disease, chronic wasting disease, scrapie, and bovine spongiform encephalopathy (“mad cow disease”). An outbreak of any of these diseases would have very serious economic, social, public health, and political ramifications for the entire country.



When Dairies Go Organic. One of the fastest-growing segments of the natural foods market, organic dairy products, is getting a boost from a U.S. Department of Agriculture–funded program at Cornell University that shares experiences of up-state New York milk producers as they make the transition from conventional to organic farming.

“Going organic represents a major paradigm shift for previously conventional farmers and for their herd,” explains Linda Garrison-Tikofsky, a senior extension associate in the college’s Quality Milk Production Services program. “We want to make sure, at the end of this challenging transition, that the milk is still healthful, the animals are healthy, and the dairy farm is still in good fiscal health.”

A three-year study, titled “The Transitioning Dairy: Identifying and Addressing Challenges and Opportunities in Milk Quality and Safety,” is being conducted in cooperation with food scientists from Cornell’s College of Agriculture and Life Sciences and the Northeast Organic Dairy Producers Alliance.

For dairy products to be certified as organic, the milk must come from animals that are managed organically—they must be fed organic feeds, have access to pasture, and not be treated with antibiotics, hormones, or certain other pharmaceutical products. Although organic milk still accounts for less than one percent of the U.S. milk market, that segment is growing at an exponential rate, according to Garrison-Tikofsky, who notes that making the conventional to organic transition takes about three years for the typical dairy farm. (photo: University Photography)



Horseracing and Equine Health. In partnership with the New York State Racing and Wagering Board, Cornell conducts drug testing at tracks safeguarding the health of the race horses and ensuring the races are run under fair conditions. Research by George Maylin, associate professor, looks at new testing procedures to detect drugs that might be used to try to enhance performance illegally. The Harry M. Zweig Memorial Fund for Equine Research receives funding from wagering on races at New York’s many tracks. The fund supports research at Cornell on equine health issues that benefit all horses, including race horses. (photo: Art Explosion)



Partners in Research, Education, and Service

Active collaborations across disciplines and organizational boundaries yield solutions that advance the health of all species.

Even a comprehensive biomedical research and education institution like the Cornell University College of Veterinary Medicine cannot, by itself, do all that is necessary. The college combines its strengths, specializations, and unique approaches with those of other institutions to forge solution-seeking partnerships that prove the value of mutually respectful collaboration. Some alignments are to be expected. Veterinary medical researchers and educators are actively engaged, by virtue of the college's full participation in the university's New Life Sciences Initiative, with colleagues in

schools, colleges, and units throughout Cornell's Ithaca campus as well as at the medical schools in New York City and the Mideast nation of Qatar. Other opportunities to partner come through the university's founding membership, with Rockefeller University and Memorial Sloan-Kettering Cancer Center, in the Tri-Institutional Research Collaboration. Other partnerships are built on mutual respect for one another's specialties. The New York State Department of Agriculture and Markets is very good at administering governmental programs, for example, while Cornell's Animal Health



Scientific Partners Around the

World. Some of the faces of veterinary medicine at Cornell have been Korean, thanks to a long-standing education and research exchange program with Seoul National University. During the last 30 years, when South Korea sought to expand its dairy industry and enhance nutrition for its people, Cornell provided postdoctoral training in livestock repro-

duction and disease control to 86 veterinarians who went on to lead the economic recovery in Korea's agricultural sector. In addition, numerous visiting scientists have participated in research training and projects. Today with ongoing collaborations in fields ranging from equine medicine to cardiology, the scientific exchange continues.

Wild Collaborations.

George Kollias, Jay Hyman Professor of Wildlife Medicine and section chief, wildlife and exotic animal medicine, and his team conduct medical rounds with Asian elephants and other animals at Syracuse's Rosamond-Gifford Zoo. Cornell's wildlife medicine program also collaborates with the Wildlife Conservation Society in an effort to control infectious-disease transmission between Africa's wild and domestic animals. (photo: University Photography)



“The science of today relies on collaborations built in all sorts of directions. We are going to solve problems only by integrating all the knowledge and techniques available.”

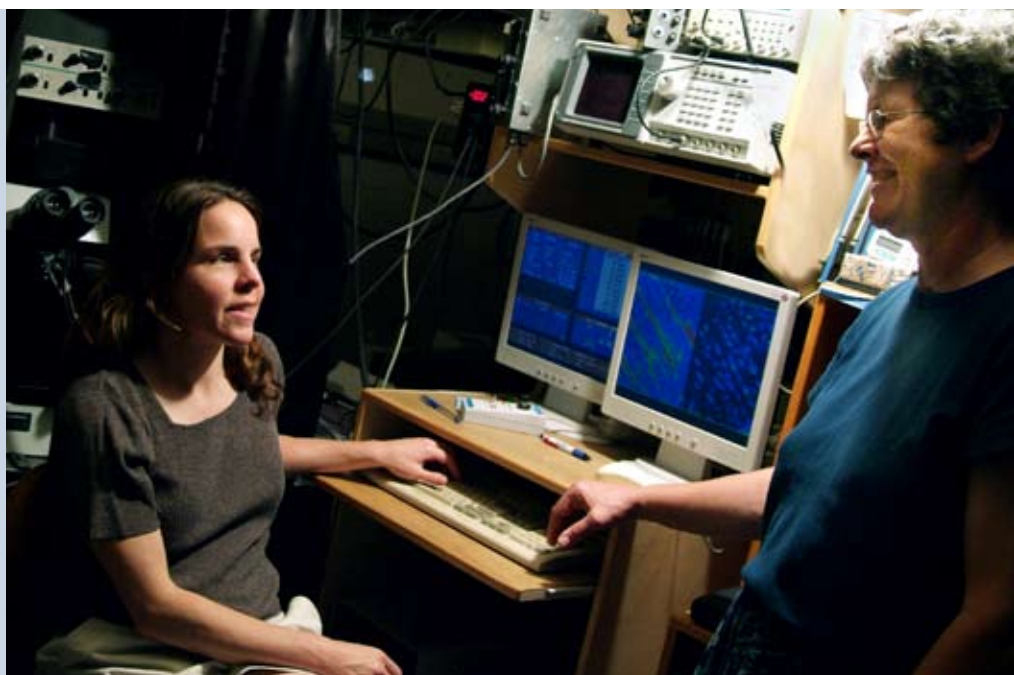
—Colin Parrish, PhD, associate professor of virology, Baker Institute for Animal Health

Diagnostic Center has a proven record in research, education, and public service. Together they are maintaining an economically important part of the state’s economy—animal-based agriculture—while protecting public health. The New York City–based Wildlife Conservation Society is best at fostering research worldwide and operating zoological parks, such as the famed Bronx Zoo, and Cornell’s Wildlife and Exotic Animal Medicine Program is a leader in education and infectious-disease research. That partnership offers the best hope yet for preserving wildlife diversity, bolstering the

economies of desperately poor countries, and training the next generation of animal scientists. Sometimes international partners in the right places arrive together at the right time. For more than 30 years the research-education collaboration between Cornell’s College of Veterinary Medicine and Korea’s Seoul National University trained veterinarians in livestock production and disease control. Now the Cornell-Korean scientific collaboration is focusing on biomedical research—opening new frontiers in human and animal health.



Partnerships for Cats. The Cornell Feline Health Center develops programs to meet the needs of the increasing number of U.S. households with feline companions. The center is well-known as a resource for information for both cat owners and veterinarians. The center’s director, James Richards, works in partnership with industry and professional groups to develop education programs for cat owners and offer consulting services for veterinarians. His recent work on the Vaccine-Associated Feline Sarcoma Task Force of the American Association of Feline Practitioners raised funds for 26 research studies looking at the connection between cancer and vaccination. As a result of its work, the task force recommended changing the site of vaccination on cats’ bodies, the reformulation of some vaccines by manufacturers, and reducing the number of vaccinations. The center shares information about improving feline lifestyles and health care with cat owners via its web site and consultation phone line.

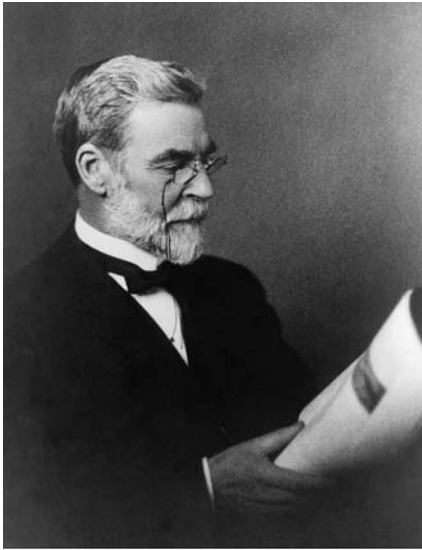


A Different Kind of Structural Engineering. The growth of bones is one of those biological processes that is so complex and requires such a high degree of precision and coordination, that it’s remarkable it ever goes right at all. The bones of an immature vertebrate—for example, a human child—have areas of cartilage, called growth plates, at each end. Through an intricate pattern of cellular division, enlargement, and death, the growing cartilage is gradually replaced by bone, so that the bone itself elongates at both ends. If you consider that the average human has two forearms, each with a radius and an ulna, and that each of those bones has two growth plates, that’s eight growth plates that must be activated simultaneously and grow in coordination with each other so that the forearms are bilater-

ally symmetrical and straight. How is that possible? A pair of Cornell researchers—Cornelia “Nelly” Farnum, professor of zoology, and Rebecca Williams, senior research associate in Applied and Engineering Physics—are taking advantage of state-of-the-art imaging technology to find out. They are using multiphoton microscopy to map the vascular system around the growth plates in the bones of transgenic mice, in hopes that this research will yield information about the flow of nutrients and chemical signals that contribute to bone elongation. By determining how the process works under normal conditions, their work may lead to insights into why it sometimes breaks down and to suggestions for improved therapeutic approaches.

140 Years and Counting

Since its founding in 1865 Cornell has been the most distinguished name in veterinary medicine.



James Law, founding dean

"Don't forget the horse doctor!" was what university founder Ezra Cornell shouted from the shore to Andrew Dickson White, the new university's soon-to-be first president, who was setting sail for Europe to hire a faculty. By "horse doctor," Cornell meant what now is known as a large-animal veterinarian. An advocate of scientific farming (and a prize-winning breeder of beef and dairy cattle), Ezra Cornell knew that New York State's land-grant university would have to teach "such branches of learning as are related to agriculture and the mechanic arts," as specified in the words of the federal Morrill Act of 1862. However, it took an epidemic of tuberculosis (one in every eight deaths in New York was from TB) and the general awareness that the disease could be transmitted by infected milk finally to persuade the state legislature in 1894. Although the original appropriation of \$150,000 was cut to \$50,000 (the first of many lean state budgets to come), at least it was official: the College of Veterinary Medicine was born. The

horse doctor whom White brought back to Ithaca was the eminent Scottish veterinarian James Law, who taught his medical science to some of the university's first students. Cornell University awarded its first bachelor of veterinary science degree (the first in the nation) in 1871. America's first doctor of veterinary medicine degree was awarded in 1876 to Daniel E. Salmon (BVS 1872), who went on to become the founding director of the U.S. Bureau of Animal Industry, where the infectious pathogen *Salmonella* was first identified and named in his honor. Another early veterinary graduate, Arthur M. Farrington, DVM 1879, headed the U.S. Meat Inspection Service. Fred L. Kilborne, DVM 1881, together with Theobald Smith, DVM 1881, discovered what was carrying the microbial scourge of Texas cattle fever—the southern cattle tick. Their demonstration that insects were capable of transmitting disease set the stage for the discovery, by others, that the anopheles mosquito carries the microbe for malaria.

Kent Loeffler



“The College of Veterinary Medicine at Cornell University endorses the concept of one biology in advancing the understanding of both animal and human health.”

—Donald F. Smith, DVM, Austin O. Hooey Dean

New Technology for Clinical Pathology and Instruction.

In 2005, the College of Veterinary Medicine expanded its pathology teaching complex with the renovation of the Gumaer Gross Pathology Laboratory and the addition of more than 3,500 square feet of new teaching and laboratory space. A new pathology teaching theater features state-of-the-art imaging technology to enhance instruction. The expanded space supports Cornell’s mission to remain a leading presence in veterinary pathology in the training of residents and veterinary students, the detection and diagnosis of spontaneous disease, the surveillance of infectious diseases, and enhanced understanding of the genetic basis of animal disease.



Baker Institute 2003

Evolution to Meet Societal Needs. Throughout its history, the college has established specially focused programs to meet new challenges. For many years, the James A. Baker Institute for Animal Health studied infectious diseases that threatened dogs, then developed vaccines that not only saved individual dogs’ lives but stemmed epidemics. Infectious diseases of cattle were kept in check by the veterinary diagnostic laboratory, known today as the Animal Health Diagnostic Center. When cats began to rival dogs as Americans’ favorite pets, the Feline Health Center—the first and still the only one of its kind at any university—responded by bridging the information gap between the veterinary profession and pet owners.

Recent additions to the college include the Sprecher Institute for Comparative Cancer Research, which addresses the similarities and

differences in cancers among various animal species, including humans, and the Center for Vertebrate Genomics, which capitalizes on the fundamental similarities in the genes that humans and other animals share to study medical conditions and seek solutions.

One mark of a successful institution is its preparedness for leadership in its field. Cornell’s veterinary deans have assured that the college remains agile and responsive—mustering its resources, developing new ones as needed, and changing priorities when additional opportunities arise. Seven years ago, departments and scientific disciplines were restructured into their current conformation: Microbiology and Immunology, Molecular Medicine, Population Medicine and Diagnostic Sciences, Clinical Sciences, and Biomedical Sciences. While the Animal Health Diagnostic Center still cares about cattle, it now has broadened its purview to public health and biosecurity. Expanding beyond its accomplishments as a pioneer developer of canine vaccines, today the Baker Institute focuses on discovering and addressing the genetic causes of medical disorders in several species, including the horse. Still an information broker to the world of cat lovers, the Feline Health Center now also sponsors research in some of the most pressing medical issues of the day.



Baker Institute circa 1960

We Could Not Do It Without You

For more than a century, the success of the college has been based on the blending of public and private support.

The College of Veterinary Medicine at Cornell University has from its very beginning been an institution with many advantages that arose from its unique situation as a public college housed within a preeminent private research university. The first “contract college” at Cornell established the operational concept whereby public funds would be managed by a private educational corporation. That symbiotic co-location and the investment from both private and public sources allows the college to investigate, teach, and serve with greater breadth and intensity. Private giving supports research on animal health, creates scholarships, and ensures a margin for excellence in academics and outreach. Public funding guarantees that New York has a source of expertly trained veterinarians, the facilities and money to conduct research and aid in the surveillance of disease, and technology and infrastructure to best serve the citizens and their animals.

The steadfast annual support of alumni and friends forms the core of the college’s participation in the private side of the public-private partnership. Giving takes many forms: annual and reunion gifts, planned gifts, and of course the greatest gift of all—the sharing of time and energy when alumni and friends volunteer for activities, mentor a student, or serve on a college or university panel. The faculty and students could not succeed without the generosity of all who support the college’s programs.

Private Gifts Provide Key Resources.

Although the gifts differed by 100 years and two zeroes, the impact of their private philanthropy on the College of Veterinary Medicine was transformational.

In September 1897, former New York State governor Alonzo B. Cornell (son of the university’s founder, Ezra Cornell) was escorting another former New York governor, Roswell Flower, around the Cornell campus in Ithaca. The horse drawing their carriage balked in front of the new veterinary college. Seizing the opportunity, Professor James Law, Cornell’s first dean of veterinary medicine, offered to show the men the new facility. Flower asked if there were any special needs. “A library,” remarked Law, at which time Flower reached into his pocket and wrote a personal check for \$5,000. The Flower Veterinary Library was born.



Public Support Funds the Original College.

By 1894, Cornell—the private university—had been teaching veterinary medicine and animal health for almost three decades. In a brilliant political move, Cornell’s President Jacob Gould Schurman convinced the state of New York to provide money to fund a veterinary college and to have it managed by the university. This concept, which also led to the establishment of colleges of agriculture, home economics, and industrial and labor relations, has served the public good for more than a century. “We are enormously grateful for the sustaining support that the taxpayers of the state of New York have provided throughout the years,” says Donald F. Smith, A. O. Hooey Dean of Veterinary Medicine. “I am overwhelmed by the respect that our legislative representatives have for Cornell’s contributions to advancing veterinary medicine and providing superior education for the next generation of veterinarians.”



“Be thrifty, but be generous in the better things.”

—William C. Hooey '12 (chemical engineering), a foremost benefactor of Cornell University

In 2003, Maurice and Corrine Greenberg were returning to the Ithaca Airport following the annual examination of their beloved Maltese dog, Snowball, at the Cornell University Hospital for Animals. Turning to Dean Donald Smith, Mr. Greenberg inquired if there were any special unmet needs in the

Companion Animal Hospital, upon which the dean described the need for an MRI system. A few weeks later, the Greenbergs provided Cornell with a gift of \$500,000 to enable the purchase of state-of-the-art MRI imaging equipment for the hospital.

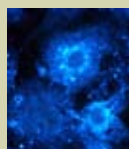


Two Special Benefactors Who Loved Animals. The owner and guardian of a beloved poodle, Ms. Austin O. Hooey, passed away in 2004, leaving Cornell almost \$7 million to endow the deanship of veterinary medicine as well as to establish a series of student scholarships. That same year another dog lover and longtime friend of the university, George Cornell, passed away, leaving more than \$40 million to support the life sciences at Cornell and an additional \$10 million to assist undergraduate students.



Going Forward—College Priorities. The pace of scientific and medical discovery by veterinary faculty will increase as the College of Veterinary Medicine benefits from the intellectual capital and enhanced facilities that will be attracted to Cornell through the university's New Life Sciences Initiative. Veterinary faculty will occupy laboratories in the Life Sciences Building. Faculty across campus will have greater connectivity and interaction. Campaign endowments raised to support faculty and graduate students help attract top talent to university and college programs. Facility enhancements also provide new opportunities for collaboration and growth of basic and clinical research efforts.

Operations and program support also plays a crucial role in the college's continued vitality. Funds specifically designated to help college and hospital programs are essential to sustain and expand work in education, clinical care, and outreach.



One of the most abiding principles of any profession is support for the next generation. By providing scholarships we open the door for many students to consider undertaking a DVM program of study, thus opening the profession to all.

The Golden Age of Veterinary Medicine

A summary of Dean Donald F. Smith's remarks to the 2005 incoming class of Cornell veterinary medical students on their first day of orientation.

Shortly before his death in January 2004, the elderly Dr. Isidor Sprecher visited for the last time the beloved library that bears his name. His departing words to me have stayed with me as a responsibility that I share with you this morning. "Don't forget," he said, "don't forget to tell the students that this is the golden age of veterinary medicine."

Why is this the golden age of veterinary medicine at Cornell?

Let me suggest seven reasons.

First, it is because of the quality and breadth of our students, whose enthusiasm for attending Cornell is often summed in the simple phrase: "The day I received my acceptance from Cornell was the happiest day of my life." You have answered the challenge to make veterinary medicine your true professional vocation and to shun the avocation model that insidiously gains momentum in some sectors of our profession.

Second, it is because we have superb faculty, working in partnership with dedicated, creative, and diligent staff. The excellence and eminence of our faculty are matched by their commitment to education. We seek a balance in our faculty between those who are clinician-scientists and those who are experimental biologists, and we place high institutional value on promoting synergy between these areas of emphasis.

Third, we belong to a great research university. Cornell was founded on the notion that the applied sciences deserve status equal to the humanities. Ezra Cornell's concept of a university where all persons could find instruction in all subjects was a revolutionary concept in the mid-nineteenth century. His ideal spawned a university with strengths not only in the liberal arts but also in the physical sciences, mathematics, and engineering as well as biology and medicine. Both the educational and research programs of the College of Veterinary Medicine are enriched and expanded by our proximity to world-class scholars who mine the entire spectrum of scientific inquiry.

Fourth is the college's infrastructure. Not only are we blessed with a superior physical plant provided by the state of New York, but all of our core educational programs are located on a unified campus. Within a common footprint, our students and faculty have access to

our teaching and clinical facilities, our research laboratories, and our outreach activities.

Fifth, we have a legacy that has been established by the professional and societal contributions of our graduates. Our alumni have provided leadership for advances across the range of fields of animal health, public health, and the biomedical sciences. Their lives and careers have had enormous impact on society, and their continued allegiance to Cornell makes them a defining force for the profession and the university.

Sixth, it is because of the remarkable generosity of alumni and friends. Private contributions that fund the margin of excellence have thankfully expanded in recent years. This growth in private support and endowment has been critical to meet the expenses of the core educational mission of the college.

Finally, we embrace our responsibilities to society. Veterinary institutions that value both discovery and education have a special role in the advancement of animal and human health. When these are accompanied by outreach to the veterinary community and the public, we are able to inform public policy as well as have a direct impact on the lives of individual citizens.

As we prepare for the bicentennial of the birth of Ezra Cornell in 2007, we ask ourselves if the future will be as distinguished as the past. Indeed it will be—if we continue to commit ourselves to validating the belief of Dr. Sprecher, who, while celebrating the greatness of our legacy, had the vision to suggest that the best is yet to come.



Donald F. Smith, DVM, Austin O. Hooey Dean
S2 005 Schurman Hall
College of Veterinary Medicine
Cornell University
Ithaca, NY 14853-6401
(607) 253-3771
dfs6@cornell.edu
www.vet.cornell.edu

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40,000



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400

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7

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1

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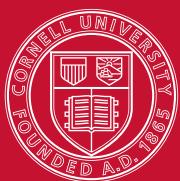
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