

The College of Veterinary Medicine Pursues Collaborations in Research, Discovery, and Animal and Human Medicine

James Law, the college's founding dean, was veterinary medicine's quintessential scientist-educator. In 1908, when Law retired from Cornell's deanship, he had fulfilled 40 extraordinary years in laying the foundation for modern veterinary medicine and veterinary medical science through an unwavering commitment to ensuring that scientific principles govern both research and clinical practice.

Law influenced the most inspired veterinary minds of the day, including Daniel Salmon, the chief of the Bureau of Animal Industry and the discoverer of *Salmonella*, and Curtis Cooper, whose finding that ticks carried Texas cattle fever demonstrated the influence of vector-borne agents in transmitting infectious pathogens through an intermediary host. This provided the model for the discovery and eradication of the mosquito vector of disease, efforts that allowed the United States to complete the building of the Panama Canal. Law's own work on highly infectious diseases such as hoof-and-mouth disease, contagious bovine pleuro-pneumonia, hog cholera, and rabies was largely influenced by his desire to have an impact on the health of production animals and, through that, to be able to improve human health and food safety.

Throughout his distinguished career in both Europe and America, Law demanded that both clinical practice and veterinary education be based on sound scientific principles. He blended this mandate with a keen appreciation for comparative medicine . . . *science must inform practice*. And he recognized equally that the focus on scientific inquiry needed to be influenced by practical societal needs . . . *practice must influence the direction of scientific research*.

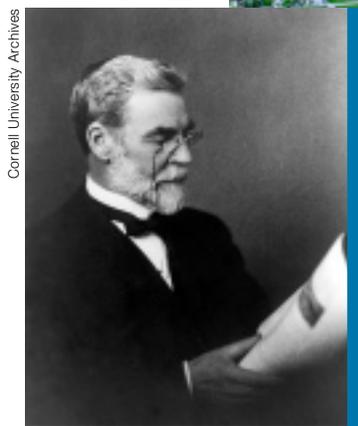
James Law's vision is still true today—the dynamic interactions that unite biology and the biomedical sciences with applications in medicine mandate the future direction of the College of Veterinary Medicine.

Translational Biology

Translational biology—the dynamic interface between discovery and application—is the unifying conceptual framework for the College of Veterinary Medicine. Discoveries identified



College of Veterinary Medicine



James Law, first dean, 1894–1908

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at the molecular and cellular levels ultimately inform the practice of both animal and human medicine. In a parallel fashion, the organization and conduct of medicine influence the type and behavior of basic science research.

Since the days of James Law, the college has had a rich tradition of advancing and promoting animal health through discovery-based research. By creating meaningful ties with other life scientists at Cornell, faculty in the College of Veterinary Medicine embrace the concept of one biology for animals and humans. Moreover, the college achieves benefits that accrue to an academic medical center through collaborative research programs that unite veterinary and comparative medicine with the biomedical and biological sciences.

Translational bonds uniting discovery and application occur today throughout the college:

Inherited eye diseases Gustavo Aguirre and Gregory Acland recently announced a breakthrough in the implementation of gene therapy to restore vision in a species of dog with inherited retinal degeneration, a collaborative project with scientists at the University of Pennsylvania and the University of Florida.

Canine and feline EPO James MacLeod and John Randolph recently began clinical trials of a drug—recombinant feline erythropoietin (rfEPO). They developed this drug to combat feline nonregenerative anemia, which is the failure of bone marrow to produce red blood cells as a result of chronic renal disease, certain types of cancer, and other chronic diseases. They are midway through clinical trials for the canine version of the drug, which they also developed. Patents for these technologies have been secured through the Cornell Research Foundation.

Joint resurfacing In collaborations with physicians at the Hospital for Special Surgery and Weill Cornell Medical College, Alan Nixon studies retrovirus gene vectors as delivery systems for genetically engineered growth factor. His goal is to develop a reliable gene therapy for the repair of equine cartilage damaged by arthritis.

Hip dysplasia Rory Todhunter and George Lust are working to identify the canine gene for the inherited form of hip dysplasia, a painful and crippling joint disease that is related to osteoarthritis in humans.

Equine pulmonary health Dorothy Ainsworth, in collaboration with immunologists Judith Appleton and Douglas Antczak, conducts molecular studies to understand better how pulmonary immunology is involved in a horse's predisposition to disease. The trio examines the immune response during exercise of healthy horses, of horses when immunomodulation is superimposed, and of horses with chronic, obstructive pulmonary disease (COPD). Their goal is to develop potential gene therapies for the disease.

Fighting infectious disease David Russell studies *Mycobacterium tuberculosis*, an ancient disease that has recently reemerged as a world health threat, with new cases in the next five years expected to number 12 million. His research team has solved the three-dimensional structure of an enzyme crucial to the bacterial growth of TB, and they are focused on developing inhibitors that can eradicate persistent bacteria. Their work holds the potential to lead to the design of drugs to help prevent the spread of the disease.

Cancer, pets, and people Rodney Page, director of Cornell's Comparative Cancer Program, leads a unique, multidisciplinary approach with the goal of developing therapies for controlling cancer in animals, with potential applications in human medicine. The program spans the physical, biological, and biomedical sciences, medicine, and epidemiology. It includes chemical biology and protein structural analysis, cellular and molecular cancer biology, genomics and transgenics, in vivo clinical trials, clinical investigation, and risk assessment and surveillance.

Cornell Comparative Cancer Program

Several major advances in knowledge about cancer have stemmed from biomedical research at the college in just the past few years.

Richard Cerione's laboratory recently revealed the molecular structure of a protein complex, Cdc42, a molecular switch that turns on essential pathways in both normal and cancerous cells, and GDI (guanine nucleotide-dissociation



Richard Cerione (l.), Molecular Medicine; Chemistry and Chemical Biology, and graduate student Gregory Hoffman (r.)

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Inherited Eye Diseases
Gustavo Aguirre (l.) and Gregory Acland (r.), James A. Baker Institute for Animal Health



Drugs for Canine and Feline EPO
John Randolph (l.), Clinical Sciences, and James MacLeod (r.), James A. Baker Institute for Animal Health



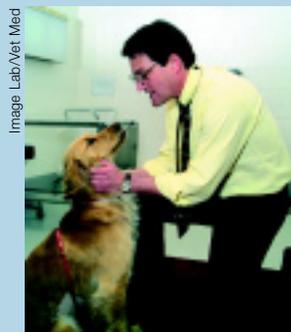
Joint Resurfacing
Alan Nixon, Clinical Sciences, in the operating room



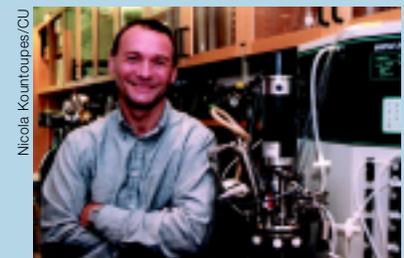
Equine Pulmonary Health
(l. to r.) Dorothy Ainsworth, Clinical Sciences; Douglas Antczak, James A. Baker Institute for Animal Health; and Judith Appleton, James A. Baker Institute for Animal Health



Hip Dysplasia
Rory Todhunter (r.), James A. Baker Institute for Animal Health, and George Lust (not pictured), Clinical Sciences

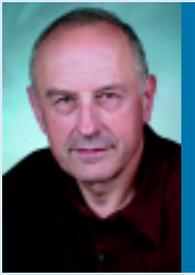


Cancer, Pets, and People
Rodney Page, Clinical Sciences; Director, Comparative Cancer Program



Fighting Infectious Disease
David Russell, Microbiology and Immunology

Image Lab/Vet Med



Bendicht Pauli,
Molecular Medicine

inhibitor), a key regulator of the Cdc42 switch. This finding sets the stage for potential development of unique tumor-blocking drugs. A goal of continuing studies is to identify new signaling molecules that influence the growth and differentiation of mammalian cells and utilize this molecular knowledge to design new classes of signaling molecules that will serve as powerful reagents for in vivo studies.

Image Lab/Vet Med



Jun-Lin Guan,
Molecular Medicine

Cancer-cell biology studies in Andrew Yen's laboratory have shown that retinoic acid, a product of vitamin A, reverses the growth-promoting effects of oncogenes in leukemia. Continued research to identify the effectors in the chemical signaling cascades used by retinoic acid may lead to enhanced therapies for those cancers, including leukemia, that respond to retinoic acid. The research also highlights the cancer-prevention role of carotenes.

Bendicht Pauli and his research team have isolated, purified, and cloned a protein that promotes adhesion of lung-metastatic melanoma cells. One goal of his continuing research is to evaluate antiadhesion therapies in the control of metastatic spread.

Image Lab/Vet Med

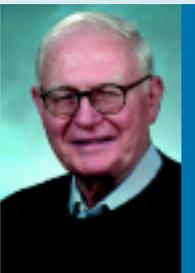


H. Alex Brown,
Molecular Medicine

Research in Jun-Lin Guan's laboratory aims to understand the molecular mechanisms by which integrin family cell-adhesion receptors transduce signals across the plasma membranes to regulate cellular migration, proliferation, and differentiation in a large number of important biological processes, including embryonic development, wound healing, and malignant transformation.

H. Alex Brown studies an intracellular enzyme, phospholipase D (PLD). He is working to identify novel proteins and lipids that modulate PLD activity. His laboratory is especially interested in the possible participation of protein-regulated phospholipases in cell transformation and metastasis and in diseases that involve immune and allergic processes.

Image Lab/Vet Med



Bud Tennant,
Clinical Studies

Bud Tennant's studies with woodchucks have confirmed that hepatitis B infection can lead to liver cancer in humans. Descendants of the Cornell woodchucks now participate in the testing of new vaccines to prevent hepatitis and of new drugs to treat the infection, which affects millions of people around the world.

Paul Bowser and James Casey study fish with seasonally occurring skin tumors to learn how cancer-causing viruses affect fish immune systems. The research could explain why some cancers regress on their own, which could lead to improved treatment for animal and human cancers.

Charles Harrington/CU



Paul Bowser (l.) and James Casey (r.), Microbiology and Immunology

Genomics As a Tool for Genetically Based Medicine

Michael Kotlikoff, who is chairman of the college's Department of Biomedical Sciences and also serves as chairman of the university's Mammalian Genomics Focus Committee and director of the Cornell Core Transgenic Mouse Facility, is building new research programs with a focus on mammalian gene function.

His goals include creation of a national center for veterinary pathology, with a residency program that is the best in the country and offers training in sophisticated technologies of genomics such as laser microdissection, gene targeting and conditional gene expression, gene knock-out techniques, and a genomic array facility run by robotics. He plans to collaborate with the Cornell Comparative Cancer Program to develop a genotyping service for canine lymphoma and osteosarcoma tumors.

Robert Barker/CU



Michael Kotlikoff,
Chair, Department of
Biomedical Sciences

Genomics research offers the broadest route to breakthroughs that will advance the practice of clinical veterinary medicine in the twenty-first century. Current genomic research at the college includes studies of mutations in cancer-suppressor genes that give rise to mammary and other cancers; the leptin pathway, where genes regulate weight gain; the calcium release complex in muscles; and the ways in which olfactory neurons find their targets in the brain.

Donald F. Smith
Dean, College of Veterinary Medicine



For more information:
<http://www.vet.cornell.edu>